620.5
v.62 pt.2

Volume 62

American Machinist

Number 14

New York, April 2, 1925

IN locomotive repair shops, machines are made obsolete by being worn out, by the introduction of improved machines by the manufacturers, and by requirements of increased output from individual shops. There is no economy in using a machine that is worn out. . . . . When increased output is required additional machines, larger machines, or more powerful machines are necessary, and there is no economy in temporizing

Getting the Most Out of Your Machine Tool Dollar

By C. A. Shaffer

General Supervisor of Machinery and Tools
Illinois Central Railroad

THE Mechanical Department of the Illinois Central is convinced of the advantages to be gained in railroad shops by replacing worn and obsolete machinery with modern equipment. A definite procedure has been established according to which machinery in our many shops is designated as obsolete and to be replaced. Little consideration is given to old machines by way of moving them around from place to place with the object of nursing a little more life out of them, principally for the reason that moving and setting up machinery are expensive operations and but add to the costliness of the tools when they are retained.

When machines will no longer meet our service requirements they are removed and offered for sale to anyone who may use them profitably, or are scrapped outright. Ordinarily we find the customer for usable machines, but occasionally they are disposed of to dealers in used machinery.

In our files are card records describing the equipment in our shops, as to age, condition, inventory value, class of work for which fitted and the like. These records make it possible for us to compare any machine in the equipment with any new machine on which data are secured.

It is a part of the duties of the supervisor of shop machinery and tools to search out new equipment and to visit the shops of the road at frequent intervals to keep informed on the condition of shop equipment. Then it is the duty of the master mechanics and shop foremen to be informed as to requirements at their respective shops and to acquaint themselves with improved equipment and methods for doing the work. Master mechanics and foremen are sent to conventions and exhibitions of machinery, and keep abreast of the times by reading of practices in other shops.

The progressive manufacturers of equipment seek out the jobs for which their machines are adapted, or they design machines for individual jobs or types of jobs, and in either case the selling material they present to us includes data showing how and in what time the work can be done. The catalogs, letters, advertisements, whatever they may be, containing these data, are filed, so that they furnish performance figures on new equipment, for comparison, just as our card file tells what our old machines are doing.

Before going further in describing our system, let me emphasize the value of the service that can be rendered to the railroads by the machine tool builders in doing experimental work on railroad jobs. The builder most likely to receive railroad business is the one that presents a plan for a given piece of work complete as to specifications of machine, design of holding equipment, specifications of tools to use and production and cost data. What I have outlined is nothing more nor less than the service idea now in use by some of the machine tool builders. It is a procedure that is entirely logical, because it requires just what the machine tool builder is best able to give, namely, engineering information on how his own product can be used to the best advantage.

In this line, some manufacturers of more or less special machinery give extraordinary service by furnishing an experienced man to supervise and assist in the work of installing their machines and then continue with the

PUBLIC LIBRARY
DETROIT

operation of the machine and the instruction of the assigned operator, turning out various actual jobs consistent with requirements, to the complete satisfaction of the purchaser. In connection with certain kinds of machines, this service is usually productive of good results as it demonstrates to the shopmen that the machine will do all that is claimed for it, and in cases where assigned operators have not had previous experience with that particular equipment, much time is saved by reason of the valuable instruction and demonstration given by the machine demonstrator.

Each year, prior to the time when the budgets are made up, the shop superintendent or master mechanic in each shop, upon request, compiles a list of recommendations for equipment wanted, showing replacement and additional machines. Reasons must be given as to why the replacements and additional equipment are wanted and the estimated saving to be effected by such improvements. All recommendations are then trimmed to suit conditions, corrected or revised and two lists made, one showing the additional machinery to be requested and the other the machinery slated to go out.

The first list includes such information as the shipping weight, the size of motor required, the estimated annual savings, and these costs: machine, foundation, wiring, insulation, stores expenditure, freight.

The second list gives the age, weight, disposition, salvage value, and these costs: original, foundation, installation, miscellaneous, removal.

Upon authorization of the budget, the net procedure is to furnish the purchasing agent a list with all necessary general specifications to enable him to invite proposals. When all bids are received and tabulated, the matter is finally referred to a machine tool committee for selection of equipment for favorable consideration.

Avoiding Waste Capacity

The system outlined is not elaborate and so far as our experience indicates, there is no necessity for any but a simple procedure in keeping equipment up-to-date. Our problem differs from that of the manufacturer of parts in quantities. He can and should keep such exact records of his equipment that he will know at any time when a machine should be replaced to bring the new machine within his maximum allowance of time during which it must pay for itself, be it five years, two years or one.

With comparatively few exceptions, the machine in the railroad shop cannot be the single-purpose, the single-job, or even the limited-job machine of the manufacturer. The best that can be done is to establish certain ranges for certain kinds of tools and stay within those ranges in buying equipment. This is what we do on the Illinois Central. For example, we do not buy lathes of extraordinary length between centers just to be able to take care of the infrequent long job. We prefer to transport the occasional job to a machine that may be in another department or even another shop. The object is to work our machines as close as practicable to the limits of their range, in that manner keeping away from waste capacity.

Stated in another way, where possible to do so, our work is divided into classes, and we draw up general specifications for machines to handle the work in those classes, keeping our specifications as brief as we can.

Reference was made to exceptions. The wheel lathes, the journal-truing lathe and the quartering machine are examples. Where the quantity of the work justifies it, individual machines will be bought for each operation. Where the shop is small, many of these operations may be done on one machine.

In locomotive repair shops, machines are made obsolete by being worn out, by the introduction of improved machines by the manufacturers, and by requirements of increased output from individual shops. There is no economy in using a machine that is worn out. A machine that has been superseded in design may or may not be continued in the shops, depending upon the kind of machine it is and the quantity of work required from it. When increased output is required additional machines, larger machines, or more powerful machines are necessary and there is no economy in temporizing.

Reasons for Replacement

In any list of recommendations for new equipment, the preponderant reason for replacement is, "machine too light for heavy duty." Other reasons for desiring the change, taken from lists submitted by the shops are: "want to change from former methods to grinding, to reduce time; want to put in a machine suitable to the job instead of using a lathe with raising blocks; badly worn and dangerous to operate; light design and expensive to operate; will not produce good work; under capacity; bad condition and will not pay to rebuild; bad fire hazard; wanted to replace hand labor; motor drive required.

The effect of existing higher labor costs in itself many times is justification for putting in more productive machinery. We cannot afford to waste the time of a high-priced mechanic on a machine of low production. Some of the old machines have been found to be so cranky that only a good mechanic can turn out good work on them. A new man will have to get acquainted with the machine and will spoil work in doing so.

Motor drive is a factor that influences replacement. It has tremendous advantages in case of break-down on transmission lines or when one machine only is to be operated, for example on night or overtime work. Then there is the greater flexibility available, such as typified on some of the latest planers, shapers, milling machines and lathes.

There is the human element to consider in balancing the pros and cons of new machines. It is only natural that the average machinist will take pride in a machine that will do things—one that is easy to operate and that will respond to his efforts to produce good work and keep it clean and free from abuse. In more cases than not there results an increased output attributable to the operator's feeling toward the new equipment.

The variables entering into the consideration by railroad repair shops of the replacement of machines are many. There are the varieties and sizes of work; small quantities; irregularities in demand on the shops; size of the shop; necessity for returning the locomotive to service in the shortest possible time. All of them must be considered when saying "yes" or "no" on replacements and new equipment. No hard and fast rule can be set. Each old machine up for consideration must be weighed with the new, and there are times of uncertainty and times when the old machine stays in. But such cases are more infrequent as methods and tools improve and as we gather more complete data on the cost to us of obsolete machinery.

[The preceding article is the second under the title, "Getting the Most Out of Your Machine Tool Dollar." The first article, by J. A. Smith, general superintendent of the General Electric Co., Schenectady, N. Y., was published on page 409. Other articles on the same subject will be published in forthcoming issues.]

PUBLIC LIBRARY DETROIT MICH

Savings in Cost of Planer Work

By Tell Berna
Sales Manager, the G. A. Gray Co.

The planer has become a production machine—Fallacy of the double-cutting planer—Multiple cutting tools —Divided and auxiliary tables for repetitive work

EXECUTIVES who are anxiously peering into the future will undoubtedly agree that we are not on the threshold of a boom year—one that will necessitate widespread plant extension and elaborate building programs. It is more likely that as business improves there will be increases in labor costs and, with the stiff competition that is to be expected, every means of getting more production per man-hour with present shop space will be scanned with care.

The chances are that the planer department is one part of the shop where this can be accomplished to a marked degree. There has been a decided change in planer design in the past five years. Ingenious labor-saving features have been applied to the machines, so that they are now truly production machines which they have never been before. However, the shop executive must be sure that the increased production obtainable will justify the increased capital investment before he throws out his old planers.

If we stop to consider what it costs to run a planer, we arrive at figures something like this:

Interest on investment; say 6 per cent on \$4,000 divided by 2,400 hr. of working time in a year	\$0.10 per hr.
Depreciation, at 3 per cent, on the same basis	0.05 " "
Heat, light, supervision and other overhead, at least	\$0.90 per hr.
Wage of operator	0.70 " "
Total	\$1.75 " "

Fig. 2—Planers equipped with auxiliary tables

Fig. 1—Planer having a two-piece table

A little study of these figures will show how doubtful is the wisdom of retaining an old planer, when a new one, in spite of the increased capital investment, promises a substantial increase in production. It is clear that the items affected by the cost of the planer are the smallest items entering into the operating cost.

If you can buy a planer that will turn out 50 per cent more work, and that planer means twice the investment per planer that you now have, the first two items will be doubled and the work would cost \$1.90 per hr., but the same amount of work would have taken 1½ hr. with the old equipment,

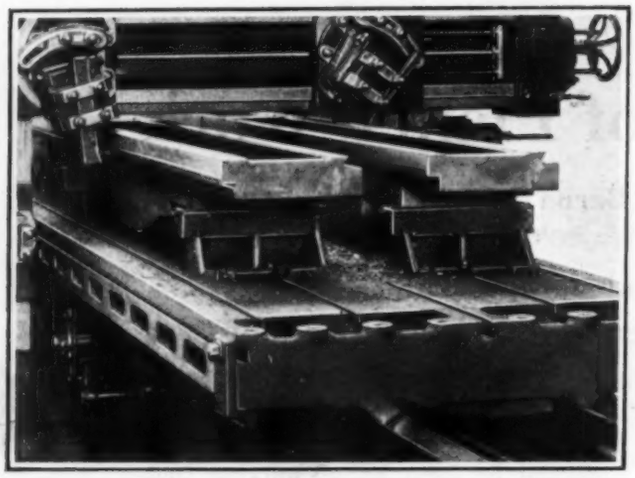


Fig. 3—An example of convenient holding fixtures

so it would have cost $2.62. With a higher wage rate the figures are even more striking. It is possible in many plants to double the output with a new planer, although the old one in good running order is considered by its proud owner as an asset. Nor have we taken into account the very severe loss that may be caused by breakdowns that are far more frequent in the old equipment.

The same data must be considered when we decide whether to buy a new planer or a used one. It is safe to say that there are no used planers on the market that embody the production features so recently developed. The actual production to be expected, even from a comparatively-good, used planer cannot be compared to that of a modern production machine. Again we are holding down the first two items, we are investing less money in the tool, but the big items remain the same. Production is low and the quality of the work obtained doubtful. It seems clear that we can well afford to increase the cost of the initial investment, providing it will enable us to get more production.

A profitable study is in connection with the relative time required for setting up the work on a planer, both for roughing and for finishing. Even a casual study will show that the big items entering into the floor-to-floor time are the roughing cut and the setting-up time. These items vary widely, but it is safe to say, in any case, that they offer the best opportunity for making improvements, nor have planer-hands been slow to see this.

The Double-Cutting Tool

One solution which every enterprising planer-hand is certain to think of sooner or later, if he has any gumption at all, is the double-cutting tool, which cuts in both directions of the table travel. Not only do the files of the patent office contain many patents for double-cutting tools of every conceivable kind, but these tools have been made and they have been known to work. However, it is clear that there are certain drawbacks which must be weighed if we are going to look at the matter fairly.

In the first place, the return stroke is now a very short part of the time required for the planer's round trip; it only takes a third or a fourth of the time required for the cutting stroke. As soon as we put on a double-cutting tool, we must run at the same speed in both directions. Furthermore, we must let one tool run out at the end of the cut, far enough to permit the other cutting tool to get into place for cutting, which adds to the length of the stroke required and this amount, whatever it is, must be added twice, once at each end of stroke. We cannot feed during the return stroke as we can on the ordinary planer job; we must overtravel enough at each end of stroke to get the desired feed.

Not only do these considerations reduce the possible saving, but we run into a further practical difficulty. The tools must be set to the same height, and that takes a few minutes every time we start with new tools. Furthermore, the impossibility of setting two tools to exactly the same level, prohibits using the device for finishing cuts. Nor is it the easiest thing in the world to design such a device for use on dovetail cutting or undercutting.

So we are adding a rather complicated device with many parts to what is now, fortunately, a simple head. In return for this expense we can hope for a moderate net saving, and this only on certain classes of our planer work. On work where the double-cutting tools cannot be used, the heads will not possess their present rigidity because of the added mechanism. Each added sliding surface, each added bearing, presents another opportunity for clearance, wear and vibration.

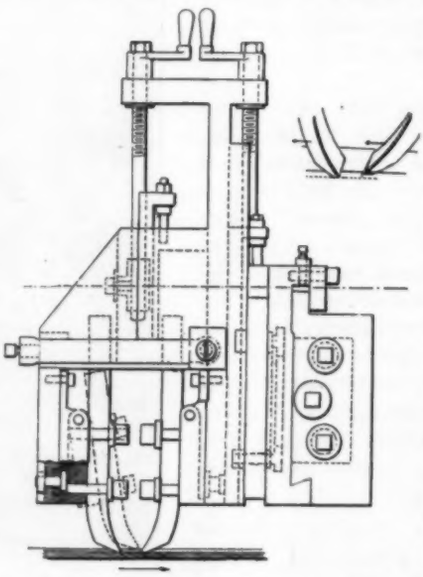


Fig. 4—One of the many patented double-cutting tools

Perhaps a more promising scheme is presented by the well-known multiple cutting tools. They can be "boughten" or home-made. The cutting tools can be set to a flat surface of some kind during the planer - hand's spare time, and are just as easily inserted as the ordinary single-point roughing tool. With four bits inserted in the holder, the feed is four times the width of the cut taken by each cutting edge. It is an excellent device for jobs where the cut isn't deep, and the single-point tool doesn't take the full power of the planer, and it ought to be used a great deal more than it is. The two- or three-point tool is a modification of this idea.

No discussion of the savings to be made on planers would be complete without mentioning the importance of properly grinding the roughing tools. They should not be diamond point tools, because such an edge cannot carry away the heat fast enough to prevent breakdown during a heavy cut. The tools should be forged from heavy stock, so that they will not chatter under the pressure of heavy cutting. The angles of rake and clearance should be ground with care. The same tool should not be used for cast steel and cast iron. The apparent saving in this procedure vanishes when we stop to consider the time lost because of the

reduction in feed necessary. An edge that is right for steel will chatter excessively when planing in cast iron. The edge that is right for cast iron will take an excessive amount of power when used in cast steel.

A novel method of reducing the setting-up time, and consequently of keeping the planer actually at work in production, has been designed by the shop men of the Miehle Printing Press & Manufacturing Co., Chicago, Ill. This idea is to place on a 36-in. x 10-ft. planer, arranged for reversing motor drive, a table in two pieces, each long enough to take a four-foot stroke, as shown in Fig. 1. While one section is in use, the other is stationary at one end of the bed. The planer-hand, or his assistant, clamps the second job on the idle section while the planer is actually cutting on the other section. This, of course, necessitates a double-length bed, to support the idle section properly while work is being clamped.

When the job is done, the table is run forward, and brought into contact with the idle section by means of the pendent switch. Two convenient clamps fasten the two table sections together so that the combination can be run to the other end of the table travel. This brings the idle section into mesh with the bull gear, and the two sections are then disengaged.

The job just finished may then be removed while the planer is at work on the other section of the table. The change from one section to the other can be quickly accomplished, and the planer is actually producing a maximum output because it is cutting a very large percentage of the time. This method can only be used to advantage when the setting-up time about equals the actual planing time, and it requires a planer about twice as long as would ordinarily be used for the actual cut.

Auxiliary Tables or Fixtures

Another excellent method of keeping a planer running, is used in the Lower Mill machine shop of the National Tube Co., at Lorain, Ohio. This plant has made what is perhaps the most thorough study in existence of the problem of running a planer continuously. Every planer has a recording ammeter permanently connected in the circuit of the drive motor. The circular chart covering the record of 24 hr. is probably marked with the planer number and sent into the office for examination every day. Such a chart often shows the planer actually cutting 85 per cent of the time, which on varied work is a remarkable result.

This has been accomplished by providing for each planer an auxiliary table or fixture having stop-pin holes and T-slots in its top, like the usual planer table. See Fig. 2. The work is clamped to the auxiliary table, which may then in turn be clamped to the planer table. The work is set and clamped to one of these fixtures while the other is in use. It doesn't take long to lift off the finished job with a crane, fixture and all, and drop the new job onto the planer table. Care must be taken to design the auxiliary table or fixture so that it will not spring excessively while being handled, or so that the work will not come loose. Special lugs and lifting chains take care of this point. The auxiliary table is made very deep.

In general, not enough attention is paid to the means of clamping planer work, with the result that the planer-hand has to putter around with bits of yellow pine, washers, nuts and various pieces of scrap, every time he clamps a job to his planer table. It is well worth while for the foreman to figure out whether it wouldn't pay to provide some simple cast-iron holding fixture, by means of which the casting could be quickly located and clamped, even on castings that have to be planed but once or twice a month. A good example of such fixtures is shown in Fig. 3. The fixtures should be painted red, so that they will be conspicuous, readily be found, treated with respect, and not made the foundation for a pile of castings.

Often projections and finished pads on such fixtures may be provided for setting the tools. This permits a high degree of accuracy in setting tools and saves a good deal of time. Some of the care and attention that has been devoted to getting a fast reversal; to modifying the shunt field of the reversing motor so as to reduce the round trip time 0.001 sec., may now be devoted to the important elements in the costs of the planer department. It will be found that they respond to treatment, and that the savings will amply repay the expense and attention required.

Conditions in the Far West

By Carroll S. Ashley

JUST a few lines to voice a gentle warning to those contemplating coming to California. If you are sure you can live on *climate*, be on your way—but bring a pocket full of money!

Los Angeles is the most advertised place in the world, and you will read of the numerous factories here, those that are coming, and the numerous men that are to be employed, etc. Los Angeles has over one million inhabitants. As one travels along its avenues and sees the thousands of luxurious homes, and in other parts of this great city, what appear to be millions of homes not so pretentious, the municipal camp ground and other places where there are people just camping out, one wonders what do all these people do.

There are thousands that are not doing anything, and they are being added to each day, since even the snow in the eastern states does not prevent the tourists from motoring to dear old California.

About ninety per cent of the Help Wanted columns in the daily papers consist of advertisements for salesmen. You toolmakers, diemakers, draughtsmen, engineers, machinists and handy men, can *you* sell *anything?* What can you sell? About the only salesmen who makes any money is in the real estate business, and according to the number of salesmen that I see on the new tracts, one must know something more than how to shift gears on an engine lathe, to make good. Salesmen of the peddler class are looked upon with suspicion, because of so many robberies.

If you could see the number of mechanics that "line up" when an advertisement calls for some mechanical job, you might be persuaded to "stick to your last." If you were to start from Los Angeles and motor East over the Santa Fé Trail, you would see numbers of motorists coming to Los Angeles, many of them with just enough money to get there. In some of the towns along the route, many are stranded, while the motors of others have broken down and they have no money to get new parts, so have to lay over and get work of some kind in order to raise enough coin to get to the land of so much promise. Ask at the oil stations along the way, let them tell you of the number of tourists

who run out of gas and beg for a gallon to get to the next station.

Every large city has its poor, and they are probably noticed more about Christmas time than at any other time of the year, but at last Christmas time, it seems to me there was more money spent in Los Angeles to help the needy, more community and organization Christmas trees, more giving of baskets of good things than ever before. Why should there be so many poor people in this beautiful country?

I would not have you think that this is not a land of opportunity. It is a land of opportunity and always be, but I am speaking plainly to those of my compatriots who are more or less incredulous and believe what they read, especially about work being so plentiful in Los Angeles. House rents and food are high, while wages are not much higher than in the East.

It was on account of all these troubles what I voiced the paradox at the beginning of this article, about bringing enough iron washers to match the climate, and incidentally keep you in eats, gas and clothes until you make a strike.

Book Reviews

Dinbuch 11. Keile (Keys). By Kurt Hentschel. Compiled under the direction of Normenausschusses der Deutschen Industrie, E.V. Published by Beuth-Verlag. GmbH, Berlin, S W 19.

Standards book No. 11 is devoted to the subject of machine keys of all the various types, flat, tangent, Woodruff, etc. Tables of the standard dimensions are given and there is a history of the development of the standards. One of the most interesting charts shows the number and sizes of keys in use before the standards were adopted and also the same figures afterward. The reduction in the number of sizes was from 341 to 52.

The Principles of Machine Design. By Robert F. McKay. Clothboard covers, 408 pages 5½x8½ in. Published by Longmans, Green & Co., New York, N. Y. Price $6.

A carefully arranged, rational presentation of the basic principles of machine design, the book deals with the productive problems of the designer rather than with disconnected theory or unsupported "practical" practice. True, it covers ground that many able authorities have already been over repeatedly. It is written, however, from a standpoint of the importance of proving theory by unprejudiced research and of supporting the apparent facts by practice in actual service.

The author has taken the constructive stand that each of these is equally dependent on the others for the best fortunes of all, that engineering is a changeable science, constantly advancing and that today's theories are tomorrow's facts, ready to indicate further benefits which may be realized by altering so-called current practice.

The book is divided into three general sections which may be defined, first as general considerations both theoretical and practical, second, various methods of making permanent and temporary connections, and third, the problem of supporting and confining machine motions.

The introduction will appeal to the practical designer and the theorist alike, so fairly are the interests of each shown to be bound up in the other.

Following chapter deal with testing and properties of materials, utility of mechanical tests, rivets and riveted joints, bolts and bolt connections, pipes and pipe installation, cottered joints, shafts and shafting, keys and couplings, and lubrication and bearings. Each contains its fund of useful information understandingly presented and well illustrated.

The last chapter forms an appendix and deals with alignment charts, illustrating their utility to the designer in solving his problems.

The author implies that more is to come from his pen on the subject. Those who read and study this book will be hoping to see the next one in print.

Workmen's Compensation Insurance. By G. F. Michelbacher and Thomas M. Nial, secretary-treasurer and assistant secretary, respectively, of the Naitonal Bureau of Casualty and Surety Underwriters. Four hundred and eighty-nine pages, 6x9 in., cloth boards. Published by the McGraw-Hill Book Co., Inc., 370 Seventh Ave., New York City. Price $4.

Here is a thorough treatise of the operation of workmen's compensation and liability insurance. It describes so plainly that the layman may understand them the processes through which the individual employer secures insurance protection against the legal liability created by the occurrence of industrial injuries. Some of the subjects discussed are the organization of insurance, classes of insurance carriers, state regulation, rate making organizations, policy coverage, rate making, merit rating, distribution of shock losses.

As an introduction to that part of the book dealing directly with workmen's compensation and liability insurance, the general problem of injuries is discussed. Accidental injuries in industry and occupational diseases are studied, because it is the occurrence of personal injuries to workmen while engaged in industry that is the basis of workmen's compensation insurance.

As a background for the main part of the book, the authors trace the historical development of workmen's compensation in Europe and the United States.

There are twenty-three appendices, containing much concrete information and including chapters giving the provisions of New York law governing rate making and the administration of rates for casualty insurance and the constitution of the National Council on Compensation Insurance.

Profits from Small Lot Production. The Warner & Swasey Co., Cleveland, Ohio. Ten 8½x10½-in. pages.

The question of economy in small lot production on turned parts is taken from the field of personal opinion and grounded on practical facts. It is discussed in the form of an actual representative problem to determine the relative value of the added facilities in the standard universal turret lathe for direct time saving as compared to time required on the plain engine lathe. The question is treated in an entirely unprejudiced manner as is evidenced by the various time periods named and illustrated. The circular represents a fair analysis and constructive answer to a very important production problem.

The Principles of Die-Casting

By H. C. Skinner
General Manager, Franklin Die-Casting Corporation

Die-casting alloys—Physical properties—Formulas for compositions of various classes—Limits of castings as to weight, wall thickness, holes and draft

THE metals used in die-castings are limited by certain requirements peculiar to the process. Either they must not be subject to excessive shrinkage at high temperatures or else they must be sufficiently strong to withstand the shrinkage. Unless one of these two conditions is met the castings will crack before they can be removed from the die. For example, an alloy of aluminum and zinc, while common in sand casting, is not suited to die-casting, although an alloy of aluminum and copper can be die-cast successfully. The metals used must not be such as will attack the surface of the die. It has been found that an alloy of copper and aluminum can be cast in permanent molds, while an alloy of copper and zinc, fusing at no higher temperature, will seriously injure the surface of the mold. The metals must fuse at a temperature low enough to avoid destroying the section of the casting machine in which the molten metal is contained, at least for a reasonable length of time. This condition has so far been one of the chief handicaps to the use of aluminum bronze in the production of die-castings.

Die-casting alloys in general may be divided into four groups:

(A)—Zinc-base alloys which were early used in die-casting, and which are still employed to a large extent in the production of many types of parts on account of their adaptability to take accurate shapes when forced into the die under pressure. The two following formulas are representative of the alloys of this class now in use:

Tin	6 per cent	None
Copper	3½ per cent	3 per cent
Aluminum	1¼ per cent	5 per cent
Zinc	89¼ per cent	*92 per cent

(B)—Tin-base alloys, or as they are more generally known, babbitt metals. They have become of special use in the production of automobile bearings and have also become commonly used in connection with various parts requiring acid-resistance or noncorrosive properties. The following formulas are representative of this class:

Tin	87 per cent	84 per cent	81½ per cent	78½ per cent
Antimony	7 per cent	9 per cent	13½ per cent	13½ per cent
Copper	6 per cent	7 per cent	4½ per cent	4½ per cent
Lead				4 per cent

*Horsehead spelter or its equivalent should be used in this alloy, or in fact any zinc alloy where the aluminum content is higher than 1¼ per cent.

The fourth article. The third was concluded on page 490.

(C)—Lead-base alloys or alloys containing a high percentage of both tin and lead. They are also used for bearings, but where the speed is slower and the heat conditions less severe, for example in stationary engines. The following alloys may be considered representative:

	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Lead	25	42	67½	75	84½
Tin	61½	48	17	15	5
Antimony	10½	8½	15	10	10
Copper	3	1½	00½	00	00½

(D)—Aluminum-base alloys. They may be divided into various groups: Aluminum-copper, aluminum-silicon, aluminum-copper-silicon. Other elements, such as magnesium, manganese, and nickel are sometimes introduced to give special color, toughness or wearing qualities.

In considering the various alloys used in die-casting, the limits of weight, accuracy and other properties possible in each are of interest. They may be classified approximately as follows:

A—*Limits, Maximum Weights for Castings

Aluminum-base	3 lb.
Tin-base	8 lb.
Lead-base	10 lb.
Zinc-base	6 lb.

B—Limits, Minimum Wall Thickness

Lead-base	1/32 in.
Tin-base	1/32 in.
Zinc-base	1/16 in. (on small castings 1/32 in.)
Aluminum-base	1/16 in. (for small castings 1/32 in.)

C—Possible Variations from Drawing Dimensions, per Inch of Diameter or Length

Lead-base	0.001 in.
Tin-base	0.0005 in.
Zinc-base	0.001 in.
Aluminum-base	0.0025 in.

Where the distance involved is several inches these limits may sometimes be reduced.

D—Maximum Number of Threads

Lead-base, external	24 per in.
Zinc-base, external	30 per in.
Tin-base, external	34 per in.
Aluminum-base, external	20 per in.

In the case of aluminum, where close fit is required, the threads should be cast oversize and chased. Where economical, internal threads may be cast in parts made

*These limits may sometimes be exceeded where the nature of the part is favorable to die-casting.

from zinc, tin, or lead-base alloys, but this is seldom possible in parts made of aluminum.

E—HOLES

Lead-base, tin-base and zinc-base, $\frac{1}{32}$ in. minimum. Regulated by depth of hole and thickness of casting.

Aluminum-base, $\frac{1}{32}$ in. minimum. Size of hole is dependent on its length and the general design of castings. Holes not cast can usually be spotted to facilitate drilling.

F—DRAFT

Lead-base and tin-base. Cores 0.0005 in. per in. of length and diameter. Side walls 0.001 in. per inch.

Zinc-base. Cores 0.001 in. per in. of diameter and length. Side walls 0.001 in. per inch.

Aluminum-base. Cores 0.015 in. per in. of length and diameter. Cores less than $\frac{1}{4}$ in. in diameter to have 0.005 in. per in. of length. Side walls 0.005 in. per inch.

While the above draft is desirable, it is sometimes possible to modify these limits where they would interfere with the service required.

Spirit Levels in the Machine Shop—Discussion

BY H. L. WHEELER

Writing under the title given above, on page 160, Vol. 62, of the *American Machinist*, E. F. Creager demands to know why he cannot purchase a precision spirit level for about the same price as a 1-in. micrometer, and points out many defects he sees in the common machinist's level, citing instances of spoiled work by the use of such a tool.

The machinist or toolmaker who never spoiled a job, is a rare bird indeed. But I have never heard of a spirit level serving as an alibi; this seems to me as a poor excuse. Many shops with which I am acquainted have whole carloads of spoiled work in the course of a year, but this condition could never be laid at the door of the humble spirit level.

COMMON AND PRECISION LEVELS

No one ever supposed that the common machinists' level was very accurate, that is in comparison with high priced precision levels. The fact is that it was never intended to be, but I think it is accurate enough for all practical purposes. I have always found a precision spirit-level available whenever I needed it, without the necessity of purchasing one. In most shops of any consequence, a high price precision level can be found in the tool crib for general use. And as a rule, it is the least-used tool in the shop. There may, of course, be the exceptional shop where such a tool is in daily use.

The average machinist or toolmaker has about as much use for a level as an Eskimo has for an ice cream freezer—except one who may be employed in assembling or setting up heavy machinery. On most machine work, surface gages, height gages, gage blocks, dial test-indicators and micrometers are much better and more popular tools than the spirit level, where extreme accuracy is of prime importance. The operator assumes the machine itself to be level and plumb and seldom gives a thought to this point.

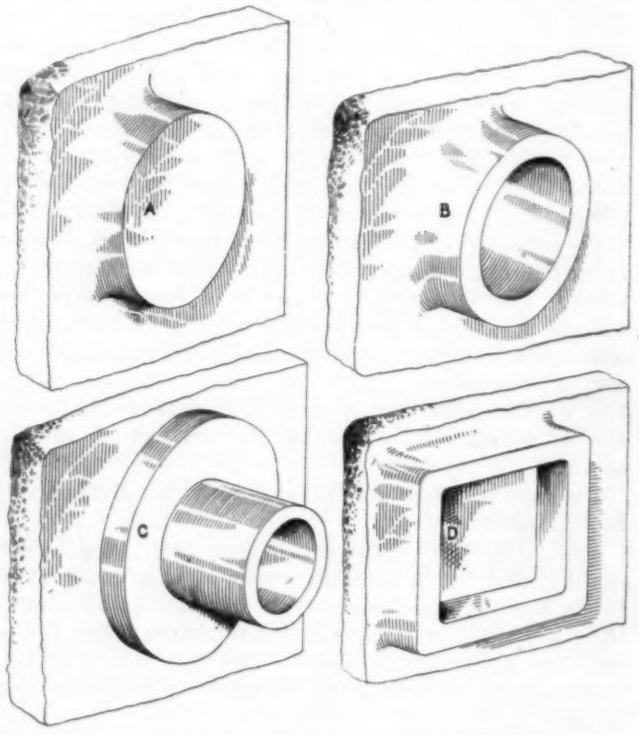
If there were any great demand for precision levels, manufacturers would not be slow to supply that demand. I think one reason for the high price of which Mr. Creager complains, is the fact that the demand for precision levels is small and consequently they cannot be made and sold as cheaply as a 1-in. micrometer. And as I view the situation, it is highly improbable that they ever will be.

Boss, Pad and Spigot

BY R. E. MARKS

Now that standardization is in the air, it seems to be a good time to discuss what is perhaps the most important standardization of all, a standard nomenclature or vocabulary that means the same thing in any part of the mechanical world. As it is, the same names do not apply in the next county, and all too frequently, in the next shop.

Just as a beginning, I suggest a standard name for a boss or pad. In some shops a round projection is a



boss, while if it happens to be rectangular and some other part of the machine bolts to it, it becomes a pad. I am not so much interested in which is right as in having a standard name adopted that will mean the same thing to men in different shops.

Shall we say round, oval, triangular, square or oblong "boss," or shall we call it pad? Is there any reason for calling one a boss and the other a pad? Some even call it a "spot."

When this projection happens to be hollow, our British friends call it a spigot, and this name is used to some extent in this country. Shall we adopt spigot for a hollow boss, or shall we call it hollow boss or pad?

Perhaps the distinction can be made when the boss is finished on its periphery, or when it fits into something instead of having something bolted to it. But in any case, let us all call it by the same name.

Here are four sketches—who can put the right names on them?

Automotive Production

Some Problems Solved in Manufacturing the Hupp Eight—I

By John Younger
Associate Editor, *American Machinist*

General policies—Individual motor drives—Specialized machine tools—Air-hose equipment to each machine—Chrome-nickel alloy cast iron — Duplication of jigs and fixtures

A FEW years ago, only a rash prophet would have predicted the present vogue for "eight-in-line" engines. It was almost a stroke of genius therefore to conceive of the idea of combining two fours in one line so that the small amount of unbalance in the one would exactly neutralize the corresponding but opposite amount in the other. The credit for doing this belongs to the Isotta-Fraschini Co. — an Italian concern that first built such engines in 1919. Then follows a series of "line eights" until we reach the most recent one—that produced by the Hupp Motor Car Corporation of Detroit in January of this year. The engine itself is shown sectioned in Fig. 1.

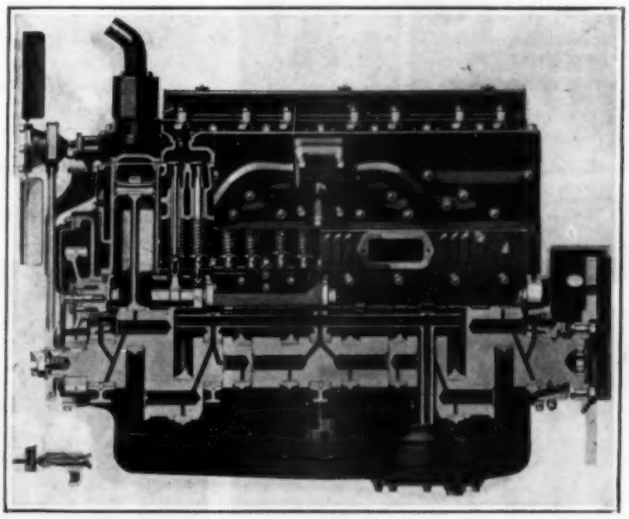
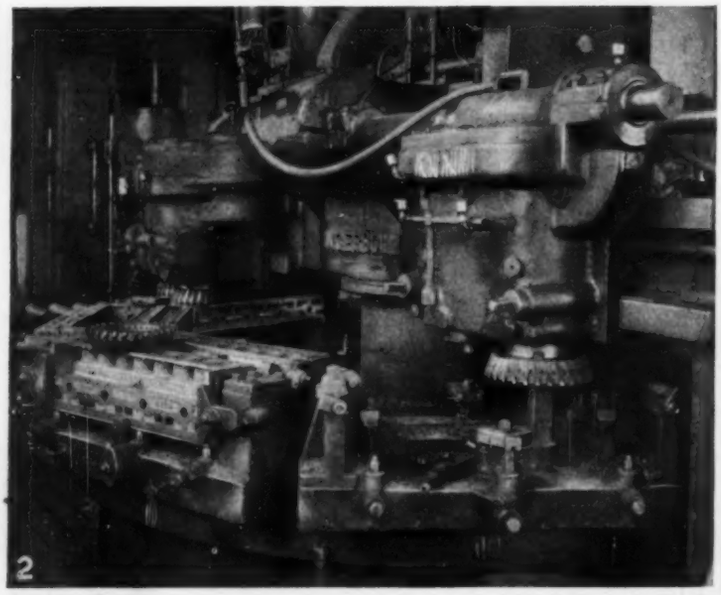


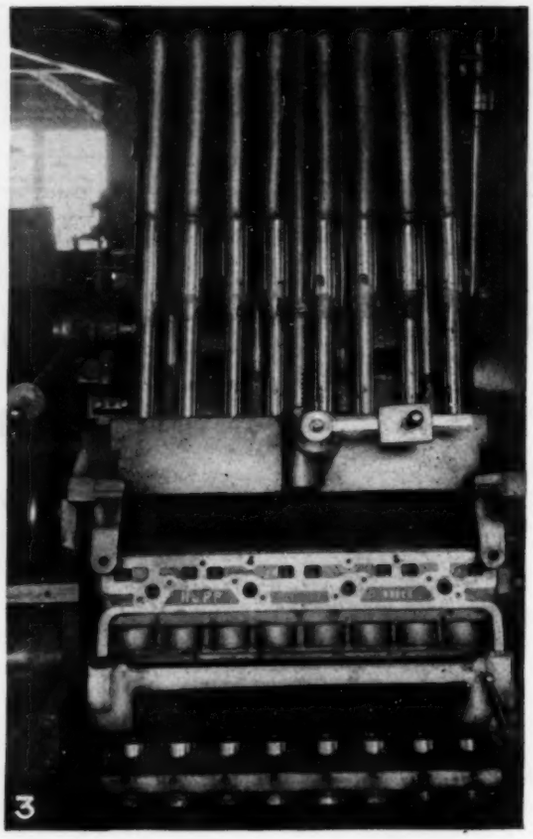
Fig. 1—Hupp "Eight-in-line" engine

The engine for this car is not manufactured alongside of the Hupp "four." When the thought of building the eight was conceived it was decided to do the manufacturing in a special building devoted exclusively to this unit. This building with its equipment, therefore probably represents the last word in engine manufacture from the viewpoints of mass production as well as high quality. The unit as a whole is arranged for a production of 120 engines a day, but such flexibility has been incorporated into it that it can work just as efficiently at half this number. This is accomplished by the simple method of having at least two machines for each operation rather than one big machine which would do the complete schedule by itself. The idea of duplication has been carried out in connection with the jigs and fixtures, but here more with the idea of insuring a liberal factor of safety in case a fixture breaks down. The duplicate fixtures are kept in the tool cribs all set up ready for immediate use.

Another feature that will be noticed in the photographs is the consistent use of individual motor drive for each machine. This makes for greater flexibility and also for an exceedingly well lighted and clean shop as there is practically no belting to obscure light and create dust. Still another feature is that practically every machine is equipped with an air hose for blowing off chips and dirt. The liberal provision of such cleaning facilities has an extremely good effect in cutting down losses from improper setting of work in the fixture due to a chip getting under a locating surface.

Beneficial effects are found to result from the process of ageing both aluminum and iron castings. These are allowed to stand exposted to the weather for several weeks before being used. Incidentally it is part of the policy of the Hupp Motor Car Corporation to carry sufficient inventory of all parts so that there shall be no possibility of delay in the production end. This is contrary to the policy pursued by some manufacturers who daily run the risk of shutting down the shop because of the absence of some vital part. The Hupp Corporation, like all well organized concerns, has its production schedule following very closely indeed on the heels of the sales schedule, but allows for no delays in a factory program.





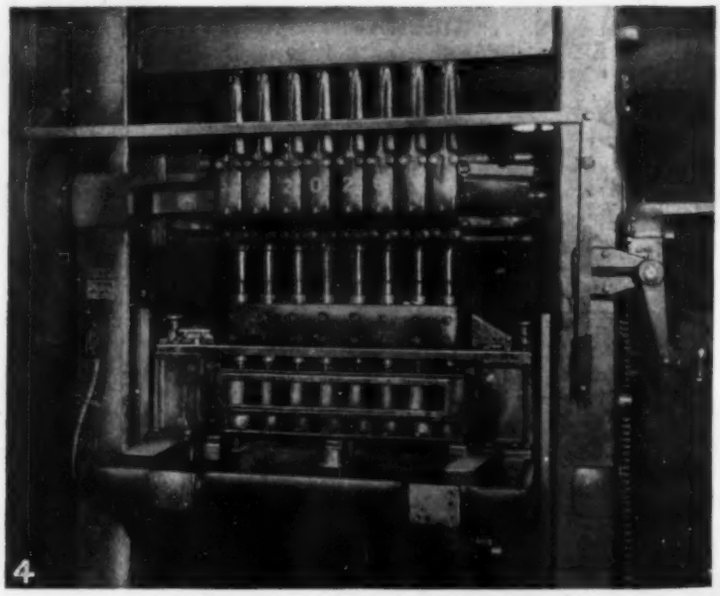


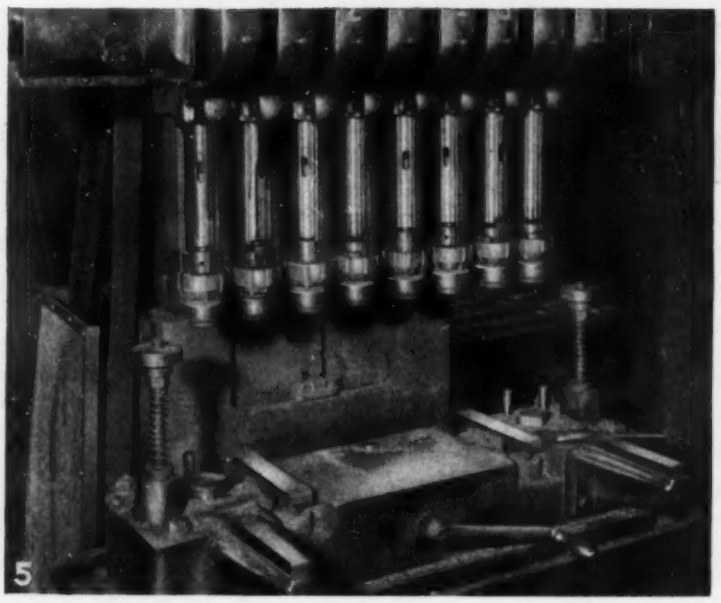
Fig. 2—Milling cylinder blocks

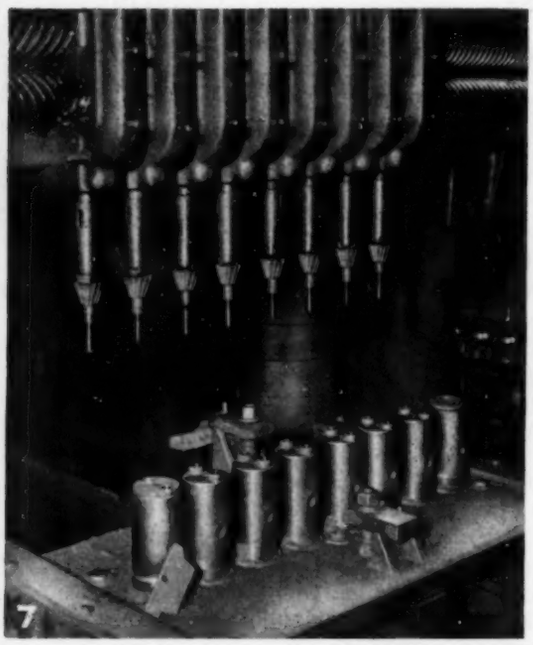
Fig. 3—Rough boring cylinders

Fig. 4—Honing cylinder bores

Fig. 5—Countersinking equipment

Fig. 7—A special milling operation





AUTOMOTIVE PRODUCTION

Operations in general follow the straight-line progressive system, the lines converging toward the ultimate assembly line. One interesting point to note here is the fact that engine manufacture is carried on in a four-story building with the assembly on the fourth floor. A liberal use of elevator facilities coupled with special tote-boxes gives good service to the assembly floor.

Cast iron plays an important part in the materials used in an engine, and it is worth while noting that Hupp employs a special alloy for its cylinders. It is sufficient to state that this is a cast iron alloyed with chrome nickel steel—8 per cent Maori ore with 15 per cent steel scrap. Each cylinder is tested at various points and the Rockwell hardness measured. This should be 78-85 corresponding to a Brinell hardness of over 180. The hardness number is stamped on each cylinder and records kept so the metallurgical history can be referred to at any future time.

The cylinders are first aged and then proceed to an Ingersoll milling machine shown in Fig. 2. This photograph shows clearly the solid type of fixture used throughout the operations, and also indicates the fact that special machines are used at every point where it can be shown there is an economic saving. There are six operations on the cylinder bores, the first four being cutting operations—boring and reaming, and the last two abrasive or honing. Fig. 3 shows the

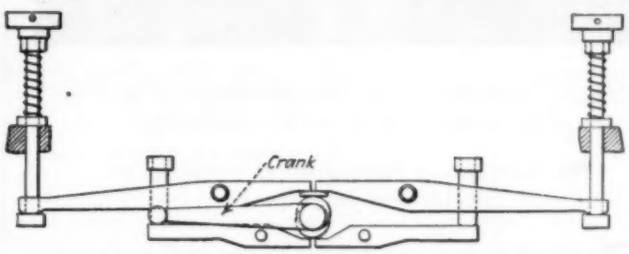


Fig. 6—Diagram fixture used while countersinking

Ingersoll boring machine in action. Fig. 4 shows a lapping or honing operation in a Moline "Hole Hog" and Fig. 5 shows a Moline machine all set up for its countersinking operation. The construction of the jig with its locating plugs and elevating ways is clearly shown in Fig. 6. After this the cylinders are honed, first by a No. 80 M stone and finally with a No. 120 M stone.

One interesting minor operation is shown in Fig. 7. The connecting rod, due to the long stroke, has barely room to clear the bottom of the cylinders so a small clearance space is milled out in the fixture shown. The two end plugs shown locate the cylinder block by means of a copper ring the diameter of the cylinder bore. These and the other plugs are bushed in the two locations necessary to mill this relief on both sides of the cylinder bore at the foot.

Another interesting series of operations is shown in Fig. 8. Here the various valve spindle holes, stud holes and the like are drilled and tapped by putting the block in a fixture and causing it to travel on a track past a line of machines. This idea, of course, is not new, but is of interest as it shows a high degree of planning in the matching up of one fixture with a number of tools.

Fig. 8—Multiple-spindle drills and track jigs

Passing now to the cylinder head, one operation on this, as shown in Fig. 9, is of unusual interest both from an engineering, as well as a production standpoint. Hupp found that to insure uniformity of explosions in each cylinder and to obtain the desirable engine balance, it was necessary to go to the extent of machining out each combustion chamber. Now these are not at all of a simple shape, but are somewhat like a blunt-apexed heart in appearance with the further complication that they have not the same uniform depth throughout. It was found possible to mill these out automatically in a Coulter automatic machine, the whole eight surfaces being done simultaneously so that perfect uniformity is obtained. The operator merely loads and unloads the special fixture—the machine does the rest.

It might be stated that there are no unimportant operations in building a good engine of any kind, and the "eight-in-line" is no exception to the rule. The

Fig. 9—Set-up for milling combustion chambers

Fig. 10—Manifold drilling set-up

Fig. 11—A drum-type drill jig

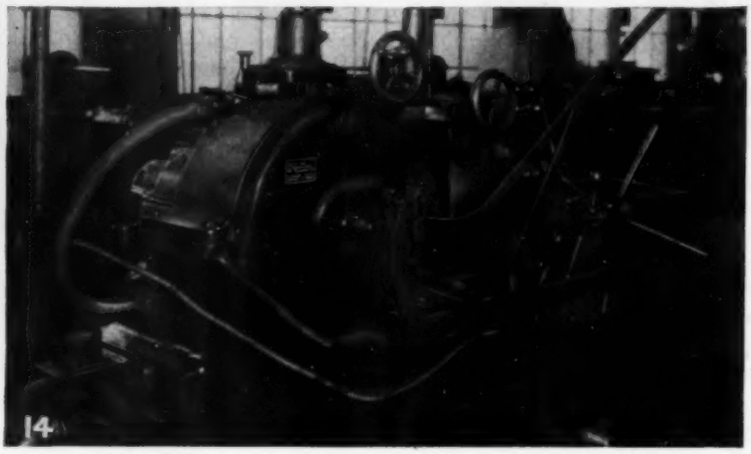


Fig. 12—Special jig for disk grinding. Note the T-slots for holding fixtures to the jig

Fig. 14—Set-up for centerless grinding of valve stem guides

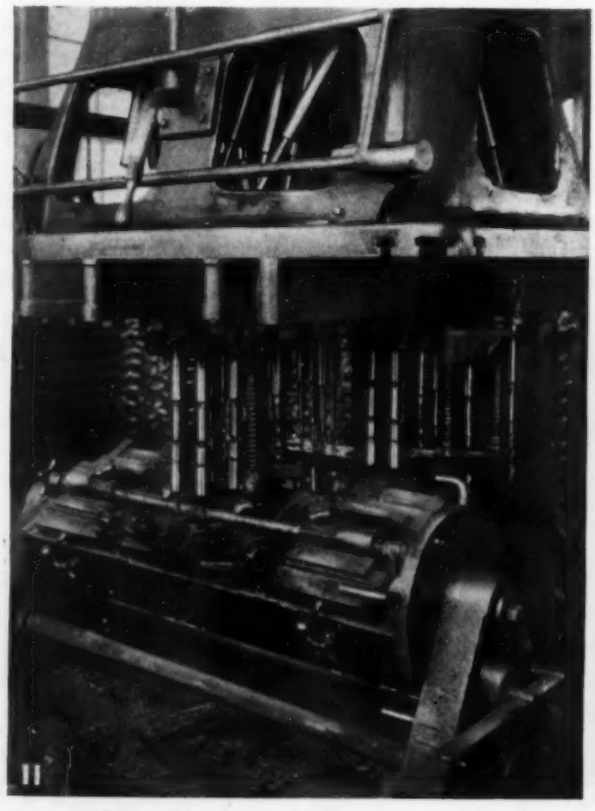
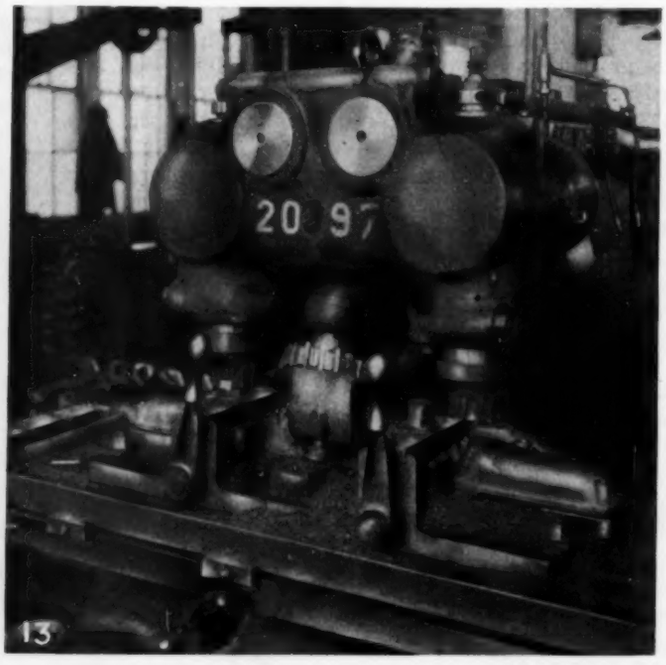


Fig. 13—Simultaneous milling of inclined surfaces



AUTOMOTIVE PRODUCTION

manifolds especially have to be carefully designed and constructed to secure proper distribution and accurate machining must be followed as rigorously as for the cylinder blocks. Fig. 10 shows an interesting duplex fixture designed for simultaneously drilling and tapping the triangular flange holes for the intake pipe in the exhaust manifold. The other side of the fixture cannot be clearly seen in the illustration but it carries a manifold just as shown in the foreground. This fixture, as well as others, revolves on ball bearings. The drill on the one side and the taps on the other will be clearly seen.

This same manifold is also placed inside the drum type fixture shown in Fig. 11 where it is operated on at successive intervals by the various drills and taps shown. The manifold itself is completely hidden by the fixture.

Another manifold, the intake manifold, is shown in Fig. 12 being face ground on a disk wheel 54 in. diameter. The wheel is in the background with an interesting four station fixture in the foreground. It will be noted that this fixture is provided with a T-slotted vertical table at each of the four stations. This is to allow for the bolting on of different fixtures so as to get flexibility in face grinding different subjects.

Another interesting specialized operation is that on the same manifold where three faces, one inclined to the other two, are milled simultaneously. This is done on the Milwaukee milling machine as shown in Fig. 13.

There is still another operation on cast-iron parts worth noting and that is the use of the centerless grinder for finishing the valve spindle guides as in Fig. 14. The castings are fed continuously down the chute shown in the foreground.

Abstracts

from other publications

Lincoln Crankshaft Practice

Charles O. Herb discusses the manufacture of the Lincoln automobile crankshafts. Practically every machine in the shop is equipped with an individual motor drive. The shop floors and other parts are kept scrupulously clean.

In the production of the crankshaft alone, there are 43 operations and 53 inspections. The shaft is ground all over for the sake of accuracy and to reduce the effort in balancing. These shafts are drop-forged from chrome-nickel steel with a high carbon content, corresponding to S.A.E. Specification 3140A. The Brinell hardness is between 285 and 300. The weight of the rough forging is about 96 lb. and the finished shaft 46 lb. When all rough finishing, turning and facing operations have been performed, but before grinding, the crankshaft is subjected to a normalizing process to relieve strain and eliminate the necessity of straightening the crankshaft either between or after the grinding steps. The work follows a zig-zag path between two long rows of machinery the forging starting at one end and coming out at the other as a finished crankshaft.

There is a dimensional drawing of the shaft together with illustrations of some of the machines and fixtures used in the work. One particular point that is described in detail is the drilling of 1-in. holes with a drill almost 3 ft. long—*Machinery*, March, p. 539.

Maintenance Shop Equipment

B. M. Ikert writes an interesting article on the change that is occurring in maintenance and repair shops. Makers of service station and repair shop equipment have come to the front with tools and devices that tend toward better and more profitable work in the shop, as well as toward lower prices. For example, the maker of a line reamer states that on a certain high-class motor car engine that required about 82 hours to do a good job of scraping in the main bearings and connecting rod bearings by hand, a line reamer did the same job in two hours with better results.

Today there is a large amount of thought being centered on reducing the time of repair operations. Sometimes it means simply grouping the several tools into a convenient form to save the time of the mechanic. Machine tool builders who have been interested in production tools have seen the possibilities. Lathe makers for example are seeking lathes for the automotive repair shops. Makers of cylinder grinding and boring tools of a portable nature and of precision-measuring devices have brought out instruments for the automotive shop which heretofore had been associated only with the machine shop.

There used to be considerable objection to tools and equipment that speeded up service operations due to the hourly basis of charging a customer, but the flat rate system has brought changes, and wide-awake shop owners now install equipment that makes it possible to do more work in a given time and are able to sell this work at a flat price.—*Motor Age*, March 12, p. 10.

Automotive Machine Shop Tendencies

In the article by W. L. Carver there is a discussion of equipment tools and it is stated that we have seen the swing from the specialized part machine to the specialized function machine which represents a more conservative and longer-lived investment. A new tendency has developed that is based on the machine tool builders' appreciation of the fact that the period of rapid expansion in the automotive industry has passed. The purely replacement market is no longer attractive, as it has almost ceased to exist.

Along with the principles that resulted in the development of the various cyclic machines, has come an appreciation that where once a gigantic source of orders existed, there are hundreds and even thousands of medium and small plants that can utilize the same principles in a different measure. Therefore, machine tool builders are turning to the development of equipment that reduces the unit labor charge for small lots in the same measure as the more expensive machines lower this item in the big shops.—*Automotive Industries*, March 5, p. 447.

Economy in Ordering Screws

By P. H McCain
Vice-President, Economy Screw Corporation

THERE has been a great deal of annoyance lately in the machine-screw trade, caused by the persistent demand of the consumer for obsolete sizes of screws. A small proportion of this demand is justified for replacement on articles that still render good service and for which it is cheaper to purchase a few small screws than to replace the whole apparatus. A far greater part of the demand is occasioned, not from such actual necessity, but from the persistent use in ordering, and the use of old terms and phrases, that are now as obsolete as the old-style screws.

The number-sizes in machine screws are now in use only up to the No. 12.

To use any larger number is to admit that one is not up-to-date in his knowledge of the present standard, and needs to become familiar with the new American Standard in which all sizes above No. 12 are expressed in fractions of an inch. No one should ever order a No. 14 screw when ¼ in. is desired, nor a No. 20 when 5/16 in. is wanted and everyone should remember that the old No. 24-16 has been abandoned. This size is so near the ⅜-16, which is standard, that it will be supplied by almost every jobber and manufacturer. This substitution sometimes goes to the extent of pasting a No. 24 label over the ⅜-in. label already on the box.

The purchasing agent, jobber or dealer, should question every order that specifies any of the following number-size screws: 14, 16, 18, 20, 22, 24, and 30, and the consumer may be assured that when his dealer questions his order, he is doing it for their mutual benefit. The consumer undoubtedly knows what he wants, and the dealer knows what can be most readily and economically supplied. It is assumed the consumer is interested in economy. He will know if the screw he wants fits in an old machine of discontinued design, and if space is so limited, that the hole cannot be retapped for the next larger standard screw. If such is the case, the dealer, jobber, and manufacturer must co-operate with the consumer. But if the consumer is building something new or can retap holes in the old machine to good advantage by enlarging them slightly, he should by all means use the standard screw.

Standard screws should be used for the following reasons:

They are continually being made in large volume at a low cost and are sold reasonably to the consumer, because of their mass production.

Standard screws are interchangeable and their use is country wide. A screw picked up at a local hardware store for a repair or replacement, should fit a hole tapped in a distant factory just as if it were made for the purpose and indeed it was if it is a standard screw.

Standard screws enable the consumer to effect an economy by using fewer kinds which have a far greater application in actual use, and so reduce the amount of working capital that must be tied up in small fittings. Standard screws also benefit the manufacturer, since they stabilize his trade and permit him to make up in advance or in his slack season, the screws that will be required, when suddenly demanded by the consumer upon a revival of business or the securing of new contracts.

From every point of view it pays to use standard screws.

In deciding to use standard screws you must not only specify correctly the number sizes or diameter but should also use the regular pitches. The coarse-pitch standard is regularly stocked and is supplied through the regular channels of trade.

The fine-pitch standard is used when a closer fit is wanted and a greater holding power desired. The finer pitch having a smaller helical angle draws the work together tighter with the same applied torsional strain.

The following is a list of screw sizes and pitches that have been adopted as standard:

Coarse Pitch	Fine Pitch
No. 2–56	No. 2–64
No. 3–48	No. 3–56
No. 4–40*	No. 4–48
No. 5–40	No. 5–44
No. 6–32	No. 6–40
No. 8–32	No. 8–36
No. 10–24	No. 10–32
No. 12–24	No. 12–28
¼-in.–20	¼-in.–20
5/16-in.–18	5/16-in.–24
⅜-in.–16	⅜-in.–24

*The 4-36 thread is still in common use.

The coarse-pitch screws are stocked and generally used on ordinary work.

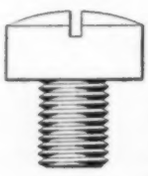
The fine-pitch screws are stocked and used on a finer grade of work. They cost 10 per cent more than the coarse-pitch screws, as they are more difficult to manufacture within the prescribed limits.

After deciding to use standard screws and specifying those of other dimensions correctly, it will be found advantageous to use one of the following style heads:

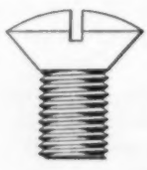
Round head. Most commonly used; the head projects above the piece fastened. Carried in stock

Flat head. Used when a projecting head must be avoided. Carried in stock

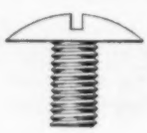
Fillister head. Sometimes used in the same manner as a round head but more often counterbored into the piece fastened, until only the crown or oval portion projects. Carried in stock by manufacturers and large jobbers



Countersunk oval. Sometimes called French oval or oval countersunk. Countersunk oval is the name least liable to be misunderstood. French heads are frequently made with a head smaller than the A.S.M.E. standard and a steeper angle underneath. The term oval is liable to be confused with plumber oval head or oval binding head. It is considered better practice to use the more descriptive name of countersunk oval. Stocked by some manufacturers, but generally made on order



Straight-side binder head. This binder head is frequently used in automatic screw-driving machines. The edge is wide enough so the heads do not lap one on top of the other when feeding down a slot. Usually made to order but stocked by some manufacturers catering to the electrical trade



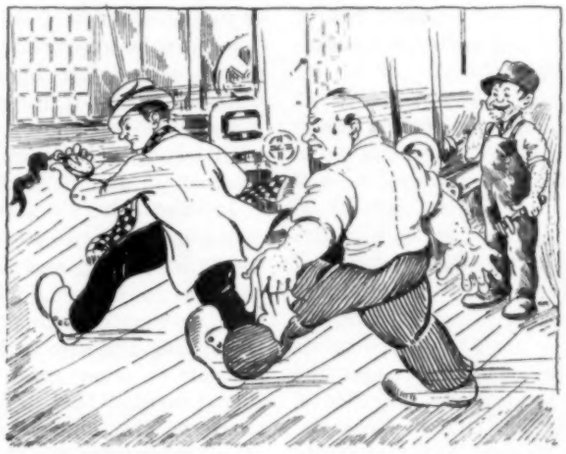
Oval binding head. Used for same purpose as straight-side binder head except it is better adapted to hand assembly than machine work

Safeguarding Power Transmission Equipment

By D. C. Wright

Careless inspection and lack of accepted safety standards for industrial hazards — Work of the Committee on the Safeguarding of Mechanical Power Transmission Equipment

ONE of the matters in which I took a definite interest while in charge of plant operations at a large mid-Western plant was the installation and maintenance of all reasonable protections against injury to the personnel and loss through fire hazards. For this reason, it was generally understood throughout the organization that I was to be notified when inspectors from various insurance, labor and government authorities visited the plant. If it was not possible for me to take the inspectors over the plant, they were at least to be brought into my office before leaving.



This arrangement enabled me to gain a first-hand acquaintance with their personal points of view as regarded possible criticism, and frequently forestalled lengthy correspondence and expensive misunderstanding as to the interpretation of rulings or recommendations. Consequently, I was very much surprised one day to get a bulky letter containing a voluminous report upon our plant conditions and a detailed order covering each one of the departments and rooms, directing that each item of equipment be guarded in a "standard" way. Naturally, I wanted to know what it was all about, as I had seen no inspector for some time. There was also a sort of studied, unvarying uniformity to the orders which sounded decidedly fishy.

After some investigation, it developed that a state factory inspector had arrived at the plant at a time when I was away and had been turned over to the plant engineer, who had taken him over the plant. It seemed that very soon after the two had set forth on their circuit of the shops, at about 11:20 a.m., the visitor had inquired as to the leaving time of the next train for Chicago. Upon learning that there was a good one leaving about 12:10, he had accelerated his gait and turned every effort toward making this train. As the area covered by the plant is large and the variety of manufacturing operations included great, even the most casual visitation usually takes at least two hours. On such a trip no time is allowed for detailed investigation, observation or check-up on individual operations, equipment or processes. The average inspector from a liability insurance examiner usually planned a two-day visit. Inspectors of this type were well equipped with maps, charts and lists of equipment, with the previous history of each item to guide them in their canvas. It was obvious, then, that any perfect stranger to the place who could rush through the entire plant in something less than an hour, and then give a detailed criticism on the entire layout, must be either a superman or else an inefficient bluffer hiding behind the known probability that in any portion of any plant there exist conditions which, under certain circumstances, could be deemed hazardous. The upshot of this particular inspection is not pertinent to the aim of this article. It is enough to say that an appeal to headquarters brought a real, broadminded, experienced investigator to check up his predecessor's report. He was able to bring things down to a basis of definite demands and recommendations, which it was possible for the company to understand and comply with.

One more illustration and the basis for my subject is established. The same corporation had plants in other states. Following out the policy of endeavoring to make these plants as foolproof as was reasonably possible from the standpoint of industrial hazards, and for the purpose of lowering their annual premiums as much as possible, an attempt was made to ascertain just what expenditures would be necessary to make one of the plants 100 per cent perfect as an industrial hazard risk. To the amazement of the management, it was discovered that even though they were prepared to go the limit in installing safety measures in absolute accord with the local code, the authorities would allow only a very small percentage reduction in the rates charged for protection. In other words, the authorities admitted that their codes of industrial standards were far from standard, and did not have the confidence of the men who administered them.

The condition as illustrated by the two cases cited above extended throughout the country and caused safety campaigns to be more or less haphazard, in many cases discouraging their promoters through their apparent inability to meet their insurers on any common

ground. Conditions were so bad that the Bureau of Standards, in 1920, was prompted to call upon the American Society of Mechanical Engineers to act as sponsors for a general committee of all interested bodies to formulate a code for the safeguarding of mechanical power transmission equipment. To this committee, in addition to the sponsors, were appointed representatives from state and private insurance bodies, organized labor, national compensation boards, the Bureau of Standards, manufacturers of transmission equipment and the National Safety Council. From time to time, individuals and organizations outside the regular committee line-up were invited to attend the meetings and participate in the discussions when matters of particular interest to them chanced to be on the schedule for consideration.

The committee met at more or less regular intervals over a period of three years. In the beginning, certain members came definitely instructed against all opposition to their avowed policy, and the representatives of two powerful states boldly stated that no matter what might be the ultimate result of the deliberation, their respective commonwealths through their industrial boards would refuse to ratify or adopt the committee report. So fine was the co-operation of individuals and organizations, both within and without the personnel of the committee, however, that the final code as issued under the stamp of the American Engineering Standards Committee bore the general approval not only of the bodies represented by the committee, but of interested engineers, corporations and industrial bodies throughout the country.

At the outset, the committee took as the limits of the scope of its responsibility that portion of the power train extending from the source of power to the point of application. The guarding of prime movers, as well as of manufacturing machines, was considered to be the responsibility of the manufacturers of such equipment and as representing distinct problems outside of the scope of the committee. Having set these definite limits, the various methods and equipment for the mechanical transmission of power from a source to its point of application were roughly classified under the following heads: Shafting, Pulleys, Belts and Ropes, Gears, Sprockets and Chains, Friction Drives, Keys, Set Screws and Other Projections, Collars and Couplings, Bearings. The items in each classification were then treated individually on the basis of their peculiar characteristics, their relationship to possible physical hazard and the best means of making them safe, or reasonably safe, from hazardous contact.

Code Open to Reasonable Interpretation

It was early recognized by all of the interests present at the meeting that, no matter how stringent it might seem desirable to make the stipulations and restrictions governing certain of the installations, the greatest good could be accomplished through making all of the provisions of the code definite, and yet open to reasonable interpretation. Thus, the general run of industry would be inclined to rally to a full co-operation, rather than to merely adopt an attitude of "do no more than you have to," such as had been engendered by the miscellaneous, arbitrary and often unreasonable rulings of the various states and industrial inspection bodies prior to this time.

It was generally recognized that even the most completely guarded of mechanical equipment was not proof against accident, when brought into combination with foolhardy or careless people. Conversely, it was admitted that there were instances of hazardous equipment, barren of all guarding devices, which had been in operation for years without even a minor accident, merely because those who operated it or had business in its vicinity recognized the hazards and were constantly alert to avoid them.

In addition to the particular items of transmission equipment mentioned above, additional sections of the code were devoted to starting and stopping devices, guard standards and operating rules. It was felt that it was probably unfair to forbid a certain practice or insist upon a certain standard without definitely pointing the way to some method of achieving the desired results with comparative ease and a minimum of expense.

An Outline of the Code

Although, as a member of the committee and at the same time an employee of a large corporation manufacturing transmission equipment, I earnestly recommend all readers of this article to obtain a copy of the new approved standard code, it may be of interest if I sketch briefly the accepted treatment of the more commonplace items of shop equipment, outlining the general attitude of the committee regarding their use.

Flywheels and similar classes of pulleys, when projecting into a room from above to a distance of 6 ft. or less above a floor or rising from below above a floor line, must be guarded. While in every case of a moving hazard a complete inclosure is deemed to be the best form of guard, it is recognized that such a method is not always possible or practicable. An acceptable substitute consists of a guard rail 42 in. high, and located between 15 and 20 in. away from the rim of the wheel.

In cases where a guard rail is specified as an acceptable guard, the rail should have a middle bar half way of its 42 in. height, and preferably a mesh or sheet filling between its posts and bars.

To prevent persons from slipping under wheels or into wheel pits, and also to guard against the possible falling of tools or other small parts into wheel pits, it is further provided that a 4-in. or higher toeboard should surround the edge of all wheel pits or floor beneath a wheel where the wheel is 12 in. or less above the floor.

For flywheels 5 ft. or less in diameter, such as are found on internal combustion engines, presses, etc., it is deemed satisfactory either to cast such wheels with solid, smooth, web centers, or else to so cover the arm center with a smooth plate of metal that the exposed portions of the wheel will present a surface free from catching or entangling hazards.

Shafting, when so located as to be accessible to accidental contact, the limit for which is set at 6 ft. or less above the floor, is stipulated for inclosure on at least three sides, the choice depending on the location or the operating conditions.

Certain latitude with reference to this ruling was extended in the case of such situations as might conceivably exist in saw mill basements or along maintenance and oiling runways, where prohibition of unauthorized entrance to the area affected and such protection as circumstances permitted, was deemed reasonable as a stipulation.

Pulleys, in addition to their individual hazards as revolving members, carry the menace of in-running belts, falling belts, cramping belts, bursting possibilities, etc. Hence, to the provisions similar to those

imposed upon flywheel guarding has been added the recommendation that a guide be provided to prevent belts from coming off, where such removal would tend to throw them into a dangerous cramping location.

To preclude the use of lightly built pulleys in unsafe service, a general stipulation is made that where the running speed is to exceed 4,000 ft. per minute, the operating conditions are to be submitted to the pulley manufacturer for special design if, in his experience, it seems desirable.

The practice, resorted to mostly through indifference, of leaving unused pulleys, or pulleys with cracks, in place on shafts is condemned as wasteful and likely to cause trouble through unnecessary congestion and bursting hazards.

Belting, whether horizontal, vertical or inclined, wherever exposed to normal contact is to be inclosed by solid or mesh guards, either completely from top to bottom or on the top and sides, depending on position and location.

Where the installation is in a power development room, a guard rail is considered permissible in lieu of an inclosing guard on the theory that only men familiar with the conditions and the hazards existing are frequenters of power plants and similar departments.

Ropes and chain drives in general are treated in the same way, as are similar installations where belting is used.

Gearing is numbered among the most serious industrial hazards, and the first choice for guarding lies in complete inclosure. In cases where band guards are the only feasible means of protection, they are made more fully protective through the specification that in addition to the band about the periphery of the gears there is to be a lip or flange extending inward toward the center of the gear at least to a line below the root of the teeth. Where, instead of a box guard mounted on the machine or structure and inclosing a train of gears, an inclosure is built up from the floor in the nature of a fence or wall, the height of this partition must be at least 6 ft., and it must extend at least 6 in. above the mesh point of the gear.

Hand-Operated Gears Less Dangerous

Hand-operated gears, such as those found on elevating or traversing mechanisms, are not put under the same rigid ban as the power-driven types, although it is earnestly recommended that they be treated just as carefully.

A great deal of stress is laid upon the hazards created by such projections on rotating objects as collars, couplings, keys, threads or set screws. In all cases, these should be either covered by smooth surfaced coverings of one sort or another, or else guarded by being located within the periphery of the revolving member to which they are attached.

In order to have a real hazard it is necessary to have not only a dangerous mechanical device but also a human being to come into possible contact with it. Since there are few regular employees on a shop payroll whose duties bring them into more hazardous relationship with moving machinery than the oilers and belt men, it is particularly urged that bearings of the self-oiling type be generally adopted and that a better equipment of belt books, shipper poles, belt perches, etc., be used than has been the practice.

In conclusion, it may be said that the committee recognizes, first, that the greatest safeguard against industrial hazards lies in a careful personnel; second, that no amount of mechanical guarding is a positive protection against injury; third, that conditions vary so widely in different industries that any set of rules must be open to commonsense interpretation and application by local authorities capable of weighing intelligently the facts in any case.

There will be no attempt to force the code upon anyone, but it is earnestly hoped that the code will be looked upon as the expression of the best expert opinion in the country, and as such will be taken as the basis for state legislation. It is encouraging to the committee that several states have already adopted the code in toto.

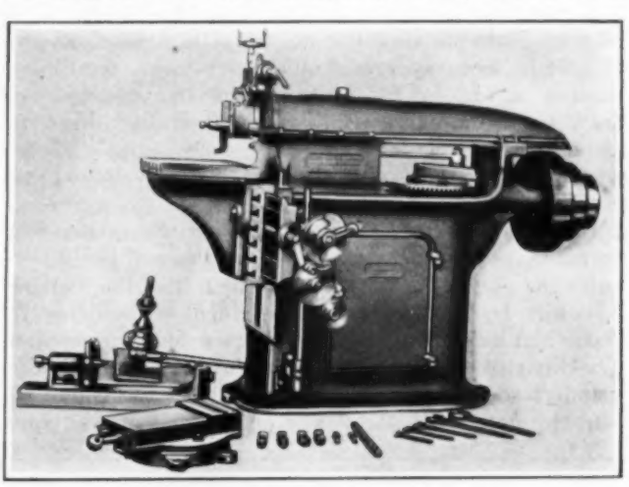
While it will not be found wholly perfect, and should be given careful revision from time to time as its effect becomes apparent in practice, at the same time it represents a unified effort upon the part of all interested parties of the country's industrial accident prevention and insurance movements to get together on a common basis of understanding. As such, the code should have the heartiest support, the most intelligent criticism and the most earnest co-operation from all concerned.

An Old Shaper

By R. C. Diale

In the shop of the Georgia Railroad Co., at Augusta, Georgia, there is an interesting old shaper.

It was purchased in 1857 from Bement and Dougherty, one of the concerns which later were consolidated to form the present Niles-Bement-Pond Co. Originally located in the shop at Knoxville, Tenn., when the Union army appeared before that city, it was one of several machines of the shop that were hurriedly loaded on to



A shaper nearly seventy years old

a flat car and taken to the Augusta shop where they were set up. The shaper is still in active service and is still capable of doing good work. Most surprising of all, until about a year ago it was operated by one of the men who helped to bring it from Knoxville. This one man has operated this single machine continuously for a period of nearly sixty years. He is still alive, but has retired because of ill health.

As the illustration shows, this machine is surprisingly massive, and its lines are particularly good, as compared with other machines built at the same period. The photograph is from an old catalog and shows how the ram is driven from a horizontal crank.

Cutting Airplane-Starter Spring from Solid Metal

By Paul T. Ash
Superintendent, Metal Products Division,
Aeromarine Plane & Motor Co.

An important part of the starter for aviation motors described on page 463, Vol. 62, of the *American Machinist*, is the double-helical spring used in the clutch for releasing the load when the engine backfires. The spring acts as a clutch of the aeromarine type by wrapping around an inner drum, or releasing when desired.

The spring is made by boring and turning a sleeve

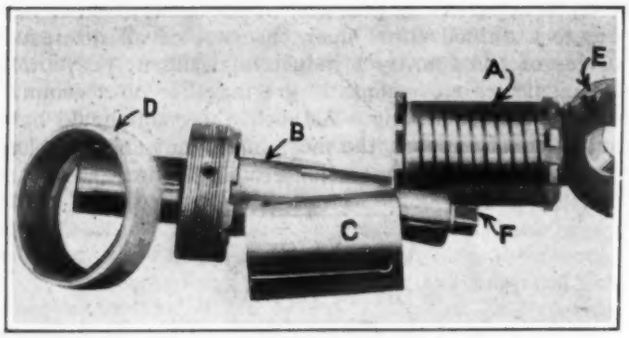


Fig. 1—The spring and mandrel

to the proper thickness and then milling a double thread clear through the wall of the cylinder. The spring, shown at *A*, Fig. 1, gives an idea of its construction, and it can be seen that the cutting clear through the wall makes the holding of the sleeve a real problem.

Beside the spring *A*, in Fig. 1 are the parts of the mandrel made for holding it. First is a solid mandrel *B* ground to a taper of 0.50 in. per foot. A sleeve *C* ground inside to fit the taper of the mandrel and having four slots, two in each direction, forms the expanding member. One of these slots engages the key shown at *B* and prevents both the sleeve and work from turning.

In operation, the sleeve from which the spring is to be made, is slipped in place so that the end projections enter the notches in the collar at the left of the mandrel. The nut *D*, Figs. 1 and 2, is then screwed on the collar and locks that end of the spring blank in position. The knurled collar *E* is pushed over the end of the mandrel so that the prongs or teeth in the collar slip into the notches in the flange on the end of the blank,

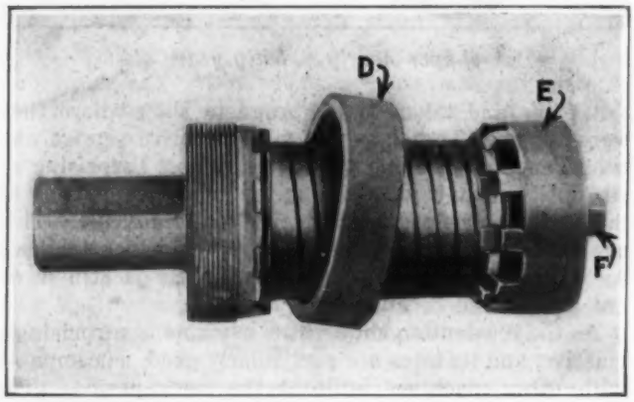


Fig. 2—Spring and mandrel assembled

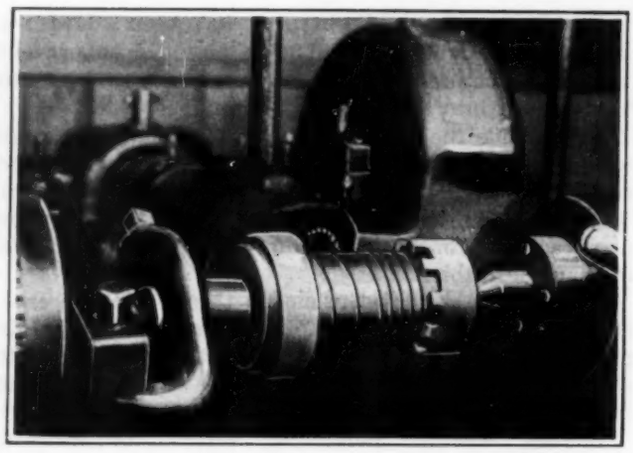


Fig. 3—Cutting the threads in the blank

as in Fig. 2. The collar is then turned the width of the prongs, locking them to the collar so that the flange at this end will be firmly held, and the end collar tightened by screwing in the taper plug *F* at the end. Details of this are shown in Fig. 4.

With the blank sleeve firmly locked in position, the

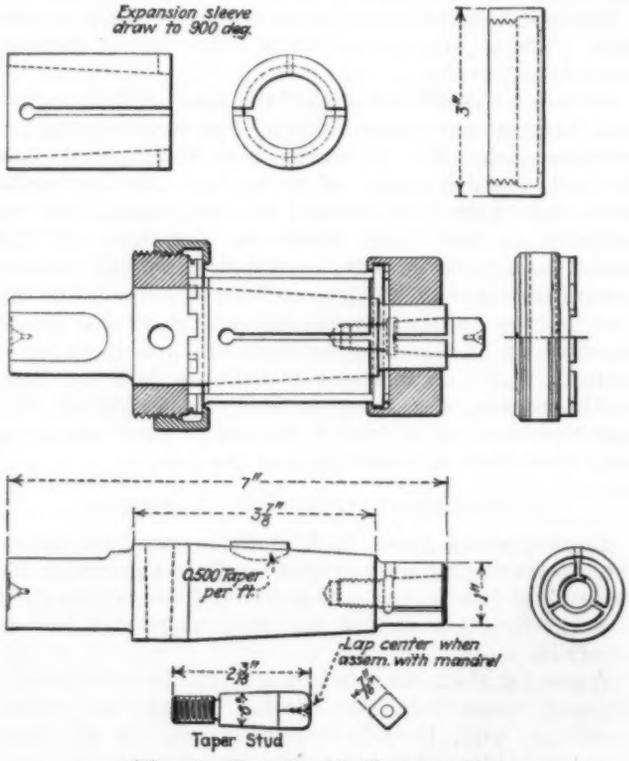


Fig. 4—Details of the mandrel

mandrel is placed in a Pratt & Whitney thread-milling machine, as in Fig. 3, and the double threads milled clear through the wall of the blank. Care is taken in setting the cutter to the proper depth, so as not to cut the sleeve of the holding fixture. First one thread is cut and then the second. And in spite of the precautions taken and the solid way in which the blank is held at each end, great care is necessary to prevent the blank from moving as the cuts near completion.

The result of the two cuts, however, gives a spring that has proved to be just what is needed for this work. The blank is of alloy steel and heat-treated to insure its having the desired temper and toughness.

Cast Sprockets for Power

1—Mold for Hetzel wheel

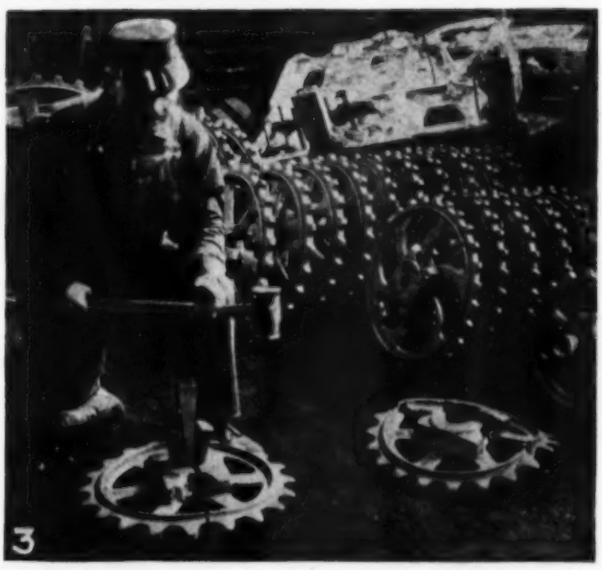
2—Shaking out a sprocket

3—Splitting Hetzel wheels

4—Grinding and chipping

5—Gaging the teeth

Photographs by courtesy of the Link-Belt Co., Chicago, Ill.



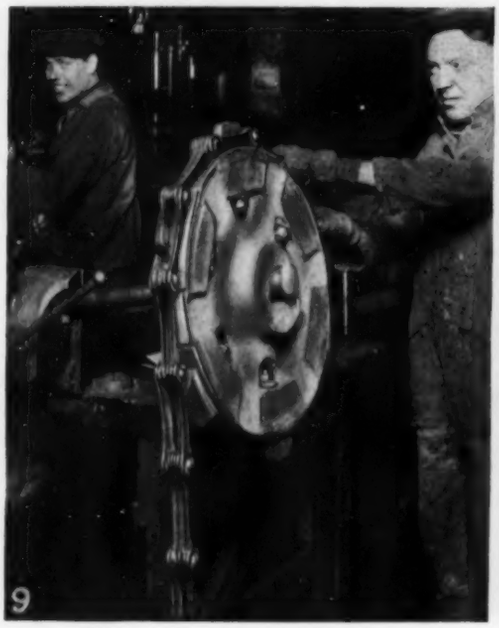
6—Grinding sprocket castings with a swing-frame grinder

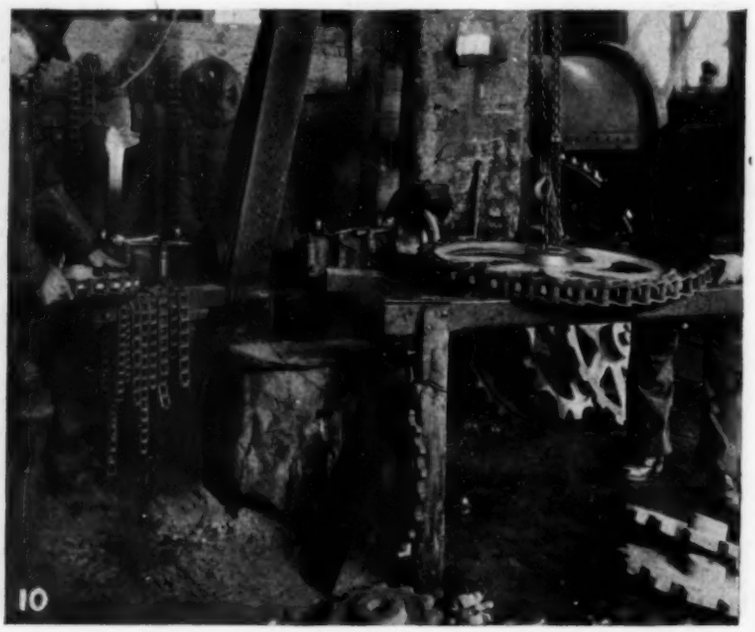
7—Sprocket suspended for grinding the teeth

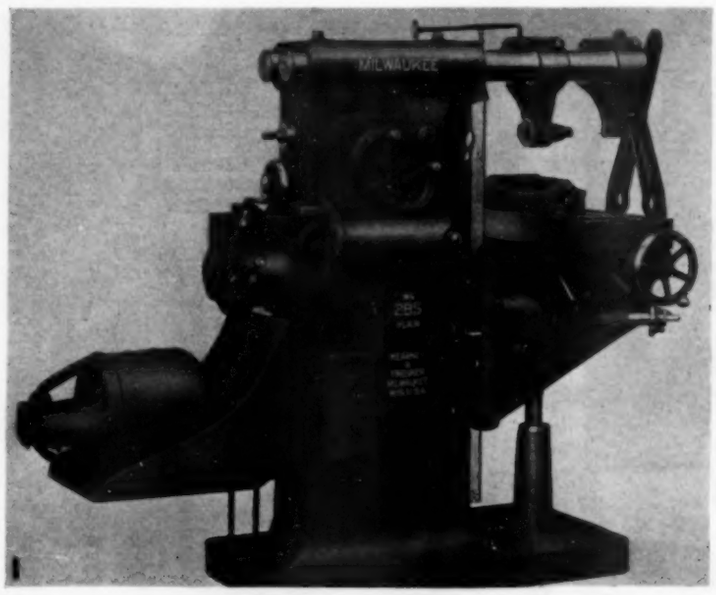
8—Fitting Ewart chains to sprockets

9—Fitting ice chains on sprockets with removable teeth

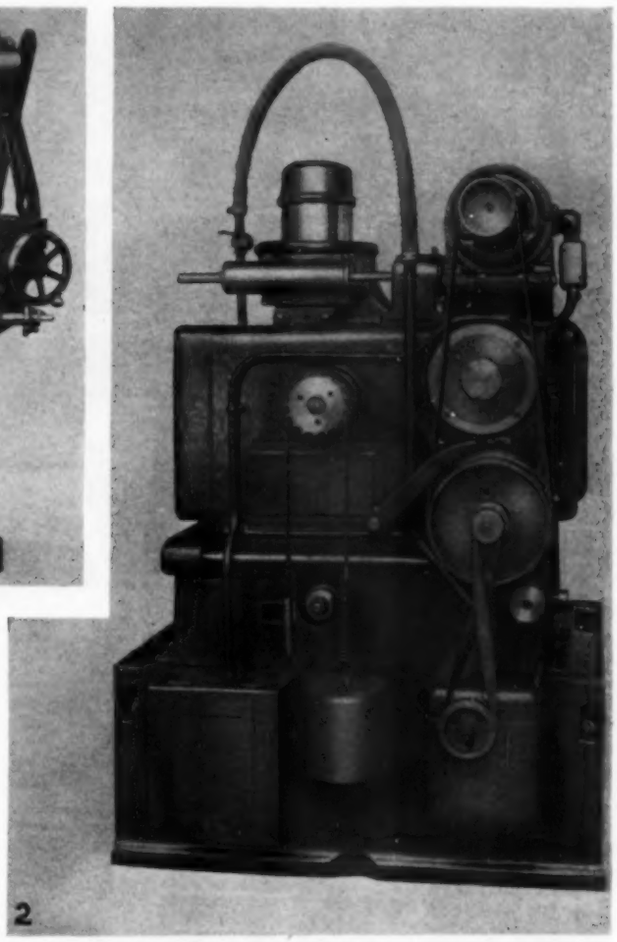
10—Fitting chains to Hetzel sprocket wheels







1



2

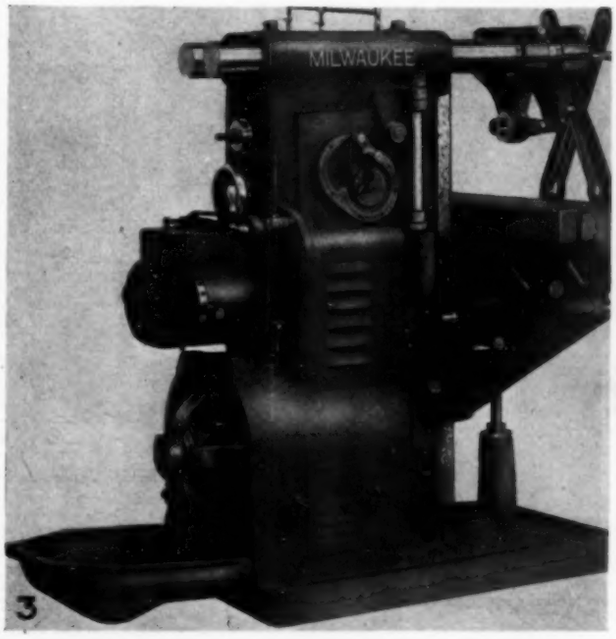
Modern Methods of Mounting Motors

1—Kearney & Trecker miller with motor on bracket behind

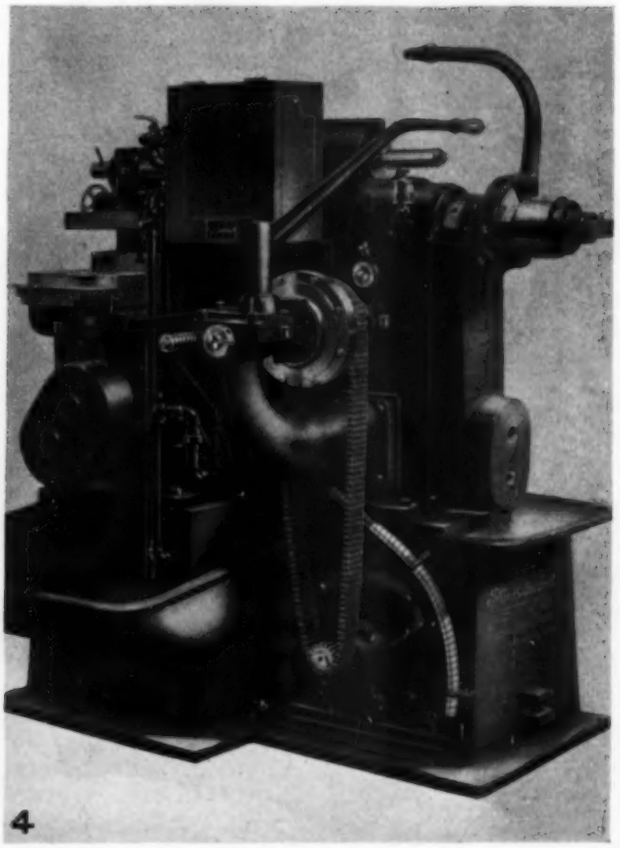
2—Fellows gear shaper, motor mounted on top. Counter-weight spring-mounted

3—Kearney & Trecker miller with motor in base—cover opened

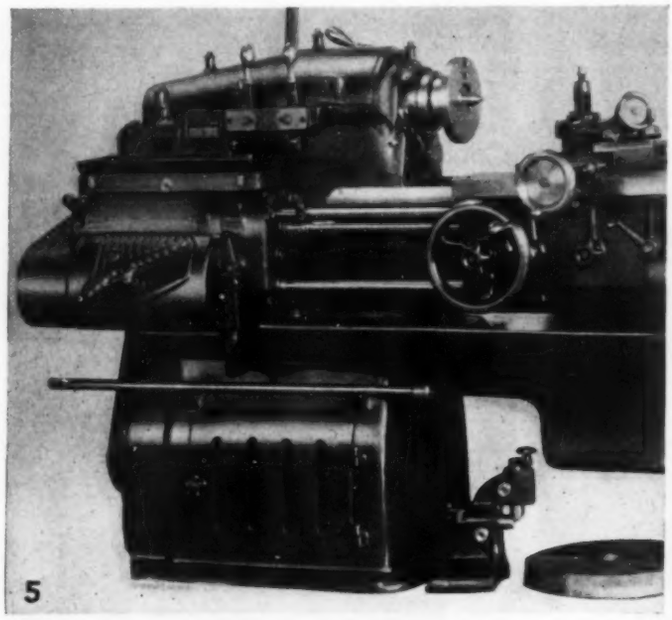
4—Sundstrand stub lathe with motor in base



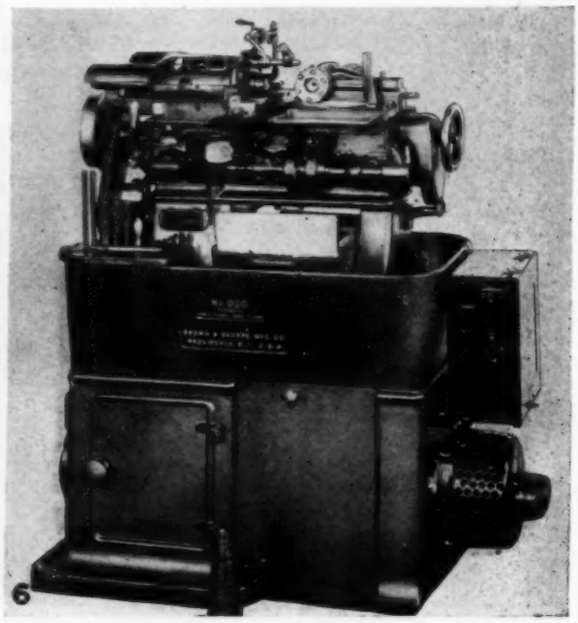
3



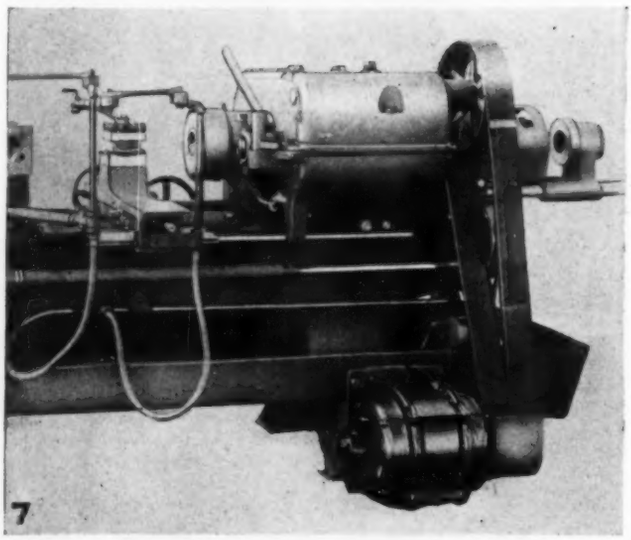
4



5



6



7

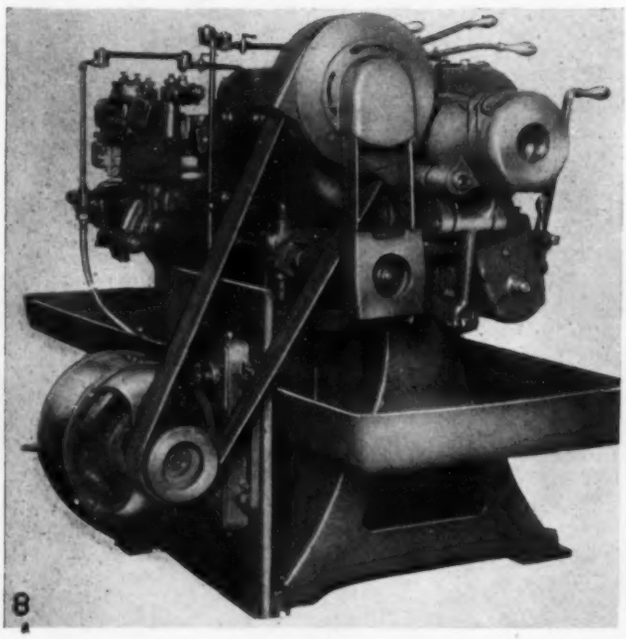
5—Pratt & Whitney 16-in. toolroom lathe

6—Brown & Sharpe No. 00G automatic screw machine

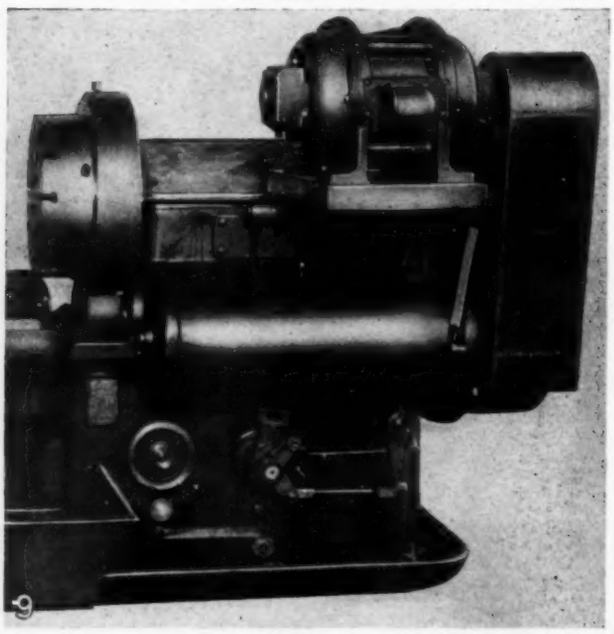
7—Foster Machine Co. turret lathe

8—Warner & Swasey turret lathe

9—Gisholt "Simplimatic" lathe



8



9

How to Estimate Machine Shop Costs

By Albert A. Dowd

The problem of job-work estimating—Equipment, tools, shop facilities and methods as controlling factors—Illustrated methods of approach to set cost figures—Handling the uncertain features in repair work

FOR cost estimating on machining jobs which come to the shop in lots of only a few pieces at a time, the estimator must consider some points in manufacture which are different from regular production work. The selection of the machine for the work is an important feature, as a machine that is suitable for production would often require too long to set up if only a few pieces are required. In a factory devoted largely to jobbing in small quantities, the nature of the equipment is an important factor in the production of the work. For this reason some factories are able to produce work at much less cost than others. Tool equipment for the various machines should be complete in order that the set-up time, which is a great source of loss in most jobbing shops, may be reduced to a minimum. Unless attention is paid to such points, the estimator is at a great disadvantage and it may often be found that work put through in small quantities is done at a loss. Any man who estimates on work of this kind, should be familiar with the shop equipment not only in a broad sense, but in more or less detail. A properly equipped planning department should have records of accessories available on the machines. Without records of this kind, the estimator is obliged either to consult the shop before making an estimate or leave the matter of equipment to the operator. Some factories engaged on short job-work, leave the estimating to the shop superintendent or the foreman of the variouus departments but this is not good practice, as it throws extra work on their shoulders and detracts from their usefulness in the manufacturing end of the business.

The Accessory Record

As a help to the estimator and also to the shop, a record of accessories should be kept to show what they are and to give their location so they can be found when they are wanted. These records can be made on cards with appropriate headings, as for example: clamps, V-blocks, parallels, faceplates, adapters, etc. Columns can be ruled for sizes, location and other important data. By using this record, the estimator can select the most useful accessories and note their location on his estimate sheet. It is a great aid in setting up the work if the operator knows just where to find a certain clamp, a V-block or some other item which he needs. A good deal of lost time can be obviated by reference to a properly made estimate sheet.

A definite method of procedure is a deciding advantage. Freehand sketches to show the method of setting up can be used to avoid losses. The estimator can attach such sketches to his estimate when the work is a little out of the ordinary, and a few minutes additional time spent in this way will often save several hours work in the factory.

Naturally, the first point of importance is the nature of the work and the accuracy required. The next point is the quantity to be made, as this determines the method of handling to a certain degree. Finally comes the planning of the work, with time study and other details. A rough estimate made rapidly, without sufficient attention to details is a serious error on the part of the estimator and should not be tolerated by the management.

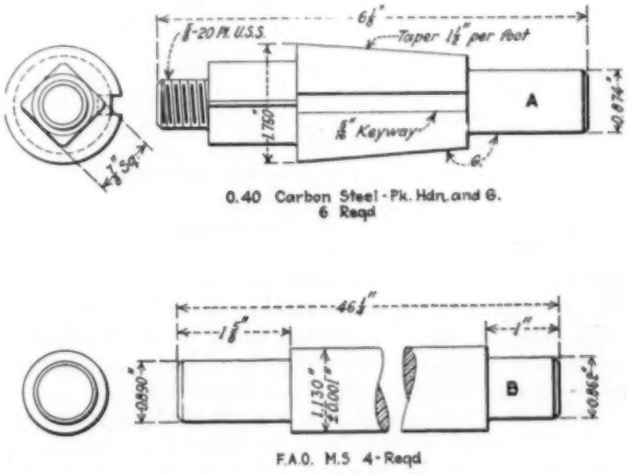


Fig. 78—Two examples of work for the job-shop

The writer saw an example of this recently, when a large manufacturing plant, previously engaged in automobile work, established an estimating department with the intention of doing jobbing work in either small or large quantities as a side issue to their regular activities. The estimates were made by young men with insufficient shop experience. As a result the prices quoted were very low and a quantity of work was secured. In a number of instances, allowances for set-up were almost entirely neglected and special tools and fixtures were not considered in detail. After a period of six months the jobbing and estimating departments were discontinued on account of the losses incurred. This is a case in point which illustrates the importance of attention to detail.

A few examples will show how such work can best be estimated. In Fig. 78 at *A*, is shown a shaft of which six pieces are required. The material is of .40 carbon steel, and the pieces are to be pack hardened and ground as marked. Now if this piece was to be made in quantity on a production basis we should probably rough it out on a screw machine from the bar, center both ends,

This is the twenty-second article in the series. The twenty-first was concluded on page 398, Vol. 62.

turn and thread it on an engine lathe, cut the keyways on a spline milling machine and finally grind it on a cylindrical grinder. It is plain, however, that this method could not be used when only six pieces are wanted for it would not pay to set up the machines for the work. We should, in the first place consider the steel itself as it would probably be ordered outside. We would next make an allowance for cutting up the bar into 6¼-in. lengths, and centering it at both ends. The best way to do the rest of the work would be to turn it all over and then cut down the shoulder at one end on all six pieces, next reverse and turn the shoulders at the other end then thread all six pieces, and finally

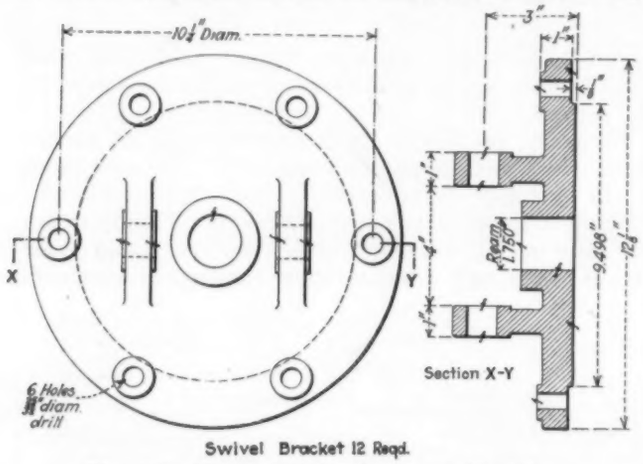


Fig. 79—Bracket for job-shop estimating

turn the taper on all of them after setting the machine. The estimator should lay out the work in this way in order to obtain the best results on the few pieces. In cutting the keyway a small milling machine would be useful and the set-up operation could be accomplished without special tools. Grinding the cylindrical portion and the taper would also be done separately.

In the other example *B*, only a plain shaft is required but it is finished all over and, because of its length, a steady rest would be required which would add a trifle to the allowance for setting up the machine. This shaft is not to be ground but is machined within the limits specified. The method used would depend upon the estimator but it might be found as economical to grind the various diameters as to attempt to turn them to size. Such matters should receive consideration according to the practice in the factory. On any manufacturing job the good judgment of the estimator must decide upon the best method to produce the work commercially, within the limits called for on the blue print.

When estimating castings which are to be machined we must first know whether a pattern is required or whether castings will be furnished by the customer. Sometimes a pattern will be furnished and castings are to be made from it and then machined. In any case this is one of the first things to consider.

Let us take, as an example, the bracket casting shown in Fig. 79. Here, a drawing is furnished by the customer but patterns and castings are not, so they must be made up and included in the estimate. There are twelve pieces to be machined and, with two exceptions, the limits are not very exacting. We should, without other instructions, assume ordinary commercial tolerances for the two decimal dimensions. In following through the work on this piece let us refer to the estimate sheet shown in Fig. 80. This form of sheet was designed particularly for estimating short jobs and the intention was to include places for all items of importance that are likely to be forgotten without such provision. On the drawing, it will be noted that the casting is to be turned, bored, faced, drilled and milled and that there are also two holes *A* and *B* to be bored and reamed. As there are twelve castings to be machined, it is worth while to lay out a good method of handling.

Referring to the estimate sheet we find the ordinary type of heading with an additional space for the number of pieces wanted. The divisions of the sheet however are quite different from others which have been shown as there are several columns under the heading of "tools and patterns." There is also a column for "machine set-up" and one for "production of one piece." We know that a pattern will be required and we therefore include this on the estimate sheet at the top, allowing 8 hr. for making it and $1.10 for the material. We estimate the cubic inches in the piece in the usual way and find that the casting will weigh about 40 lb. We assume the twelve castings to weigh 500 pounds.

Estimating the Work

We decide to first machine the bottom of the casting, boring and reaming the hole in the same setting as this is the natural way to handle the work. Many estimators would specify a plain lathe job here, but we will be more progressive and assume that a turret lathe of suitable size is available. Having a 3-jaw chuck, we can set the piece up in this type of machine and use standard tools for the machining, thus doing the work more rapidly than would be possible on an engine lathe. It will take a little time to adjust the machine and set the stops and various tools for duplication of work for which we should make sufficient allowance. For the next operation, we would need a fixture of some kind but we could improvise one from a standard face plate and a 2-in. plug. We allow 2 hr. for making the plug and about 6 lb. of material. These items are entered in the columns under the head of "tools and patterns." We also note that several clamps will be required to hold the work in position, but, as these are standard, they can be obtained in the tool crib. As the face plate must be put on the machine and the plug set in position, in addition to the clamps, and as a couple of forged tools will be required for facing, we must allow sufficient time for this set-up, let us say 1½ hours.

We next consider straddle-milling the lugs *A* and *B* previous to boring them. It is a simple matter to locate the work on a plug on the milling machine table and, by means of a gang of cutters, face the bosses. No special tools are required for this operation but as the setting up requires some time we will allow 1½ hr. The actual milling time would not take over 3 min., but the work must be set up and removed after finishing so we would allow 12 min. for each piece.

The next operation is laying out and prick-punching the six bolt holes for drilling. Nothing special is required for this operation but it is worth mentioning that it would be better to drill these holes previous to the milling operation, paying particular attention to their location with respect to the lugs which are to be milled. One of the holes could then be used to locate from in straddle-milling and boring the lugs. These points would undoubtedly be considered by a good estimator. He would specify the method of location on the

estimate sheet, probably making a free hand sketch to show the methods to be followed.

After all these items have been entered on the sheet they are totaled and the summary is given at the bottom with a slight additional allowance for material handling, tool grinding, etc. A delivery promise date entered at the foot of the sheet completes the estimate.

If there are several other pieces which form an assembly with the piece mentioned they may be included under the same estimate number. Each one should be put on a separate sheet, however, and a summary of all should be given on a final summary sheet as in previous cases. With this form of estimate sheet it is practically impossible for an estimator to omit any important items although he may accidentally omit an operation.

In any sort of estimating involving repairs, such items as assembly and disassembly, and possibly some final fitting must always be taken into consideration.

EST No. 5643 SHEET 1 OF 1 SHEETS
CUSTOMER S. and K. Mfg. Co. Pontiac, Mich.
PART NAME Swivel Bracket MATERIAL C.S.
B.P. No. A-4620 NUMBER REQ'D 12

OP. No.	METHOD OF HOLDING AND MACHINE OP'N'S.	MACH. REQ'D.	TOOLS AND PATTERNS: KIND	LABOR HOURS	MATERIALS: KIND	LB.	COST	MACH. SET-UP MINS.	PROD. PIECE MINS.	REMARKS
	Pattern Reqd.		Pine	8	Pine		1.10			
	12 castings @ 40 Lbs		C.S.			500	40.00			
1	Pickle and sand blast	7 dry								
2	Drag	"								
3	Hold by O.D:- bore	#2 A	3 Jaw Ch.					120	10	Dept. No. 12
	ream and face one side	W.T.C.	Boring							
			Reaming	Std						
			+ Fac. Tools							
4	Hold on plug on face	16"	16" Face pl.	Std				90	8	Dept. No. 11
	plate - Use bar - clamps	Eng. Lr.	2" plug	2	M.S.	6	.60			
	Face bosses + center hub		3 clamps	Std						
5	Locate on plug and	#4	Plug above	-				90	12	Dept. No. 8
	clamp on mach. table	B. & S.	(4) 6" Sides	Std						
	Straddle mill lugs	Mill M.	Mill cutters							
6	Layout (6) holes and	16"	25/32 Dr.	Std				30	10	
	prick punch - them	Dr. Press								
	drill (6) holes									
7	Bore and ream holes	Boring	Boring bar	Std				30	15	
	A and B Locate from	Mach.	Reamer	Std						
	drilled holes									
	TOTALS			10			41.70	360	55	

TOTAL TOOL COST 10 HRS. @ 2.00 20.00
TOTAL MAT'L COST $41.70 + 10% 45.87
ALLOW FOR SET-UP 6.0 HRS. @ 1.25 7.50
PROD. TIME FOR (1) PIECE $\frac{55 \times 12}{60}$ = 11 HRS @ 1.25 13.75
ALLOW FOR CONTINGENT TIME ..... 2 HRS @ 1.25 2.50
TOTAL ESTIMATED COST $89.62
DELIVERY:- 2 weeks after receipt of formal order.

Fig. 80—Estimate sheet for job-work

Allowances for this kind of work are difficult to determine. In making an estimate involving replacement of a broken part, it is sometimes necessary to figure on an entirely new pattern, a casting and complete machining. In other instances, it may be found more economical to repair the part by brazing or welding. Pulleys, chucks and gears are often repaired by fitting-in, such as applying a reinforcing piece or setting plugs in place of broken gear teeth. Soldering, welding and brazing are often used, especially when broken castings like housings and gear cases are involved. Operations of this kind can seldom be made the subject of an estimate as there are so many unknown factors.

A repair shop which specializes on brazing or oxy-acetylene welding can sometimes estimate the cost of a given job with a reasonable degree of accuracy providing the work is not too intricate. A well defined repair job which does not involve a great number of difficult problems can best be estimated by looking over the actual work. The estimator should discuss methods of repair, with the shop men and then make plain sketches to illustrate how the work is to be done, finally using these sketches as a basis on which to make the estimate. Allowances should be made to cover all possible contingencies. When a portion of a machine has to be torn down and re-assembled each item disturbed should be entered on the estimate sheet and allowances made to cover disassembly and refitting in addition to an allowance for testing the part repaired.

It will be seen that this sort of an estimate often requires special knowledge, particularly when a large casting or forging is considered. The suggestions which have been made apply to work, of such a nature that the labor involved can be directly analyzed. There are, of course, many cases where repairs must be made on machinery which has been so badly damaged that the extent of the injury cannot be immediately determined. In such instances it is necessary to do the work on an hourly basis.

All factories find it necessary, from time to time, to repair and overhaul their equipment and in such work the estimator finds a fertile field. Men who refit bearings, align moving machine parts such as slides, carriages, etc., should be selected with respect to their experience on this work, and they should not be permitted to proceed without some sort of a system. While the varying conditions of machines make the overhauling time a variable quantity, the fitting of a spindle and its alignment, or the alignment of a slide, are operations which can be estimated unless the parts are very badly worn. The estimator can determine the condition of the machine from the inspector's report and with this as a guide, an estimate can be made which will come close to the mark. Even though this work is not done on a piece work basis, the workman can be given to understand that the job should not take over a certain amount of time, so that he will be inclined to complete it as soon as possible.

Average Speeds and Feeds for Milling

The question of the best speeds and feeds for milling seems to resolve itself largely into a matter of common, ordinary horse sense. According to those whose business it is to sell production by the milling method, for that is what milling-machine builders do in these days, it's a simple matter to get a maximum, average production on almost any job.

For ordinary steel, a roughing speed of 60 ft. and a finishing speed of 75 ft. per min. is a good average for high-speed steel cutters. Having the machine set for the proper speed (and the slower roughing speed is due to the heavier cut) the next step is to increase the feed until the chips turn blue. This combination gives very good results on average work. As a rule the cutters will stand a feed of about 0.020 to 0.030 in. per tooth per rev. For extra-hard steel, such as rails and rail-joint parts, fish plates, etc., the speed will probably have to be dropped to 40 ft. per minute.

Stellite tools will stand a higher cutting speed, about 110 ft. for roughing and 120 ft. per min. for finishing. The feed, however, must be about half that of high-speed steel or from 0.012 to 0.015 in. per tooth.

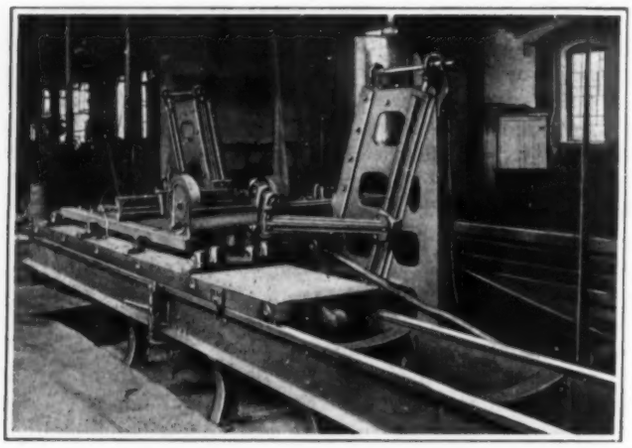
Ideas from Practical Men

The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from five dollars upward, according to their merit

A Pioneer Surface Grinding Machine

By Henry Densmore

The illustration shows a double-head surface grinding machine that was built many years ago in one of the large manufacturing plants of New England. It is capable of handling work of exceptionally large size and at the time is was built was considered to be a very efficient machine, but in the light of modern practice



An old-time grinding machine

it is not well calculated to apply the large amounts of power absorbed by present-day machinery of its class.

The inclination of the frames carrying the cross-rails is for the purpose of keeping the driving pulleys as low as possible and thus avoiding the necessity for bringing up extra columns to support them midway of the vertical range. The driving pulleys are mounted in bearings at the upper ends of short rocker arms that are linked to the respective cross-rails so that constant center distances are maintained regardless of the vertical movement of the latter.

The belts drive to flanged pulleys supported in independent bearings at the rear of the cross-rails and the extensions of the wheel spindles are splined to pass through them so that no lateral movements of the belts are necessary.

The cross-rails are gibbed to slide on the inclined faces of the columns and are provided with elevating screws, operated by means of bevel gears from horizontal shafts on the top of the columns. Other screws, geared to the same shafts, move saddles from which angular braces extend to the backs of the cross-rails, to assist in sustaining the thrust of the grinding wheels.

The slides of the cross-rails are pivoted to the rails and may be rocked, or tilted, by means of the small handwheels to be seen above and about midway of each rail. This movement provides for minor adjustments of height to feed the wheels to the cut.

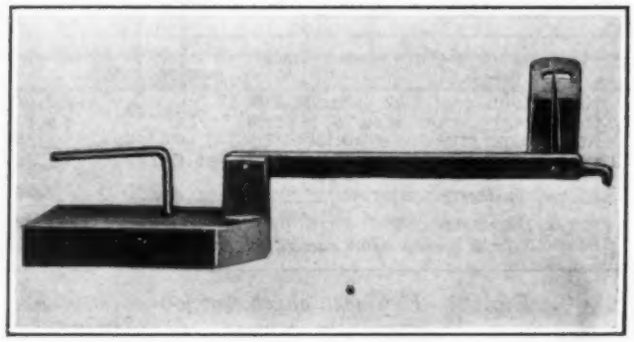
Though this machine lacks many of the refinements of modern surface grinding machinery, it is capable of doing good work over a wide range of sizes, and it shows that the principles of grinding were well understood long before the possibilities of the process in the way of power and variety of application, as exemplified by later machines, were appreciated.

A Direct-Reading Surface Gage

By Donald A. Hampson

The average commercial surface gage has a reach of not more than 5 in. from the edge of a piece of work. When a reading is desired at greater distance, it is common practice to bend a crook near one end of a long piece of wire as a substitute for the regular finger, but such a makeshift is apt to be too slender to be of real value.

Another disadvantage of the commercial gage is that it does not give a definite reading unless a rule is used



A surface gage with a long reach

in connection with it; and, further, few mechanics are able to distinguish between "just touching" and a thirty-second or so, when using a long slender finger with a pointed end.

One shop has castings to plane that are about 3-ft. long, on which it is worth while to know before starting a cut whether or not there are any low spots in the center. A cut that cleans up the edges nicely but runs out in the center when the tool is nearly across is just so much time wasted.

The tool here illustrated was made for the purpose of overcoming the difficulties mentioned above. It was made for this one job only, and has well paid for itself, though the production is but three or four castings a

IDEAS FROM PRACTICAL MEN

week. It has a working range of ½ in., which is quite sufficient for the job.

The cast-iron base weighs about 10 lb. and is shaped to suit this particular job and the set-up on the planer. A handle near the center of gravity allows it to be lifted in balance.

A rectangular arm, made from tubing, extends to such length that the finger will reach 18 in. from the edge of the work. The finger is shaped like a bell crank, has a feeler at the working end, and the other end made into a pointer that traverses a plate graduated to read in fractions of an inch of difference in the vertical plane.

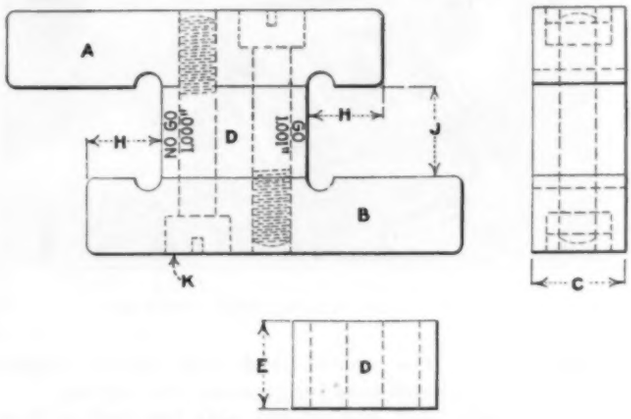
With this tool a workman can set up his job with some degree of assurance that it will clean up on the first cut. The amount of difference in height for which he must make allowance can be read directly from the graduations. If desired, a cut can be started at one edge of the casting and the surface thus dressed compared with the remainder of the casting to see how much the planer tool must be set down. Guess-work as to depth of cut is thus eliminated.

A Built-Up Snap Gage

BY E. F. CREAGER

The illustration shows a snap gage that is "built-up" and which I think posesses some advantages over many that I have used. It is not expensive to make, and is of long life, owing to the large wearing surfaces. It is not liable to mar highly finished work, and is readily readjusted correctly, requiring only the faces of the arms to be lapped to restore its original accuracy.

Parts *A* and *B* are duplicates, except for the finish lapping of the maximum dimension on the short end of



A built-up snap gage

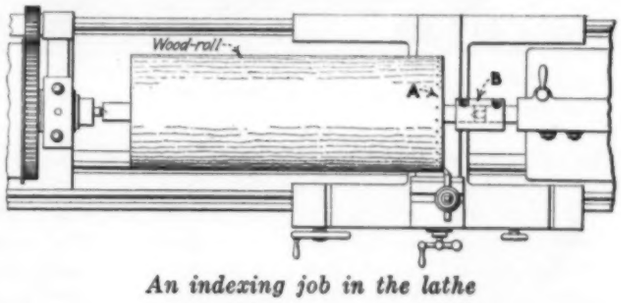
A, and should be made of high-speed steel for the longest life. The width *C* should be made as great as convenient. For very constant usage, the wearing faces of the arms can be faced with stellite if desired, or by using a clamp instead of the screws for fastening together, they can be made entirely of stellite. This however would make the gage slightly more cumbersome. Part *D*, the filler block, is made with the dimension *E* to the minimum of the measurement to be checked. It is subjected to no wear, so does not change size and needs no operation when the gage is corrected for wear. If the gage becomes obsolete for any reason, this block can be ground down to a smaller size, or laid aside if a wider one is required for the new dimension.

The dimension *H*, depth of throat, should not be less than $\frac{1}{16}$ in. greater than the radius of the piece to be measured. Of course, if it is deeper there will be just that much more measuring surface to wear off before the gage becomes inaccurate. The maximum dimension *J* is made by grinding or lapping the short face of arm *A*. The screws *K* should be a smooth dowel-fit in the arms *A* and *B* and the filler block *D*. If the dimensions are marked on the filler block, the arms can be used with other blocks without grinding off the marking. With filler blocks to the dimensions required, accurate gages can be quickly set up for special work or small lots and a large amount need not be tied up in fixed gages. By using a clamp to hold the arms, "Jo" blocks can frequently be used for filler blocks.

Fluting Rolls in an Engine Lathe

BY GORDON E. ROBERTS

Having some wooden rolls to flute that were too large for our milling machine and dividing head, we mounted the rolls on centers in the lathe, using no driver, such as a dog or chuck, thus allowing the roll to turn freely on the centers. Since we wished to cut thirty flutes,



An indexing job in the lathe

we set the dividers to the chord of 12-deg. times the radius of the roll and spaced thirty witness marks *A*, around the outside of the roll. With the aid of a surface gage with its pointer set at the height of the centers and mounted on the carriage of the lathe, we indexed the roll by bringing the witness marks to the pointer of the surface gage.

As each witness mark came up to the pointer, the roll was clamped with the clamp *B* mounted on the tail stock spindle.

For cutting the flutes we sped up the lathe spindle and feed to get as fast a carriage travel as possible, set the tool to the depth of cut, put in the carriage feed and cut one flute by traversing the carriage. At the end of the cut the tool was withdrawn a little and the lathe reversed and the carriage ran back ready for cutting the next flute. Cutting the other flutes was simply a repetition of the first operation except that the clamp *B* had to be loosened and tightened at each indexing.

The tool was kept sharp and the running of the lathe spindle did not disturb the position of the roll.

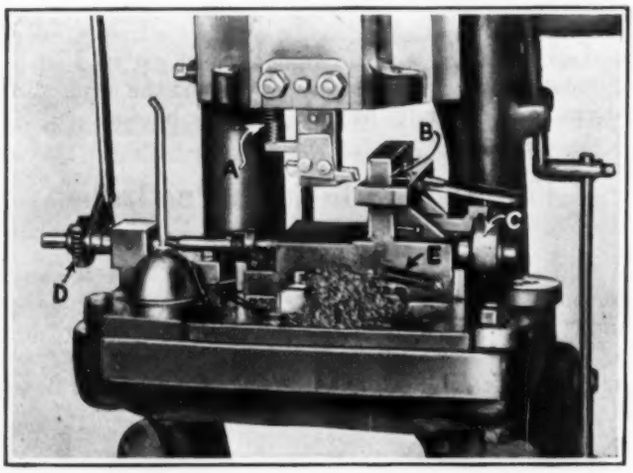
IDEAS FROM PRACTICAL MEN

Using a Punch Press as a Slotter

BY HENRY DENSMORE

Some time ago while on a visit to a small New England machine jobbing shop that is in the habit of taking on occasional contracts for manufacturing work, I came upon the device here illustrated by which a punch press had been converted into a slotter for repetition work, and that without any alteration of the press.

I do not know for what the piece was to be used, nor do I remember its shape, but that is a matter of interest only to the producer of that particular job.



Slotter job on a punch press

The principle of the device was new to me and seemed adaptable to a variety of uses.

The tool post goes in the gate of the press and its construction is obvious from the picture. The part in which the cutting tools are clamped, swivels upon the shank in such manner that it acts like the clapper of a shaper, its position being fixed while on the down stroke and swinging away from the work against the pressure of the light coil-spring *A* on the up stroke to relieve the drag of the tools.

The work piece is clamped to, or in, the upright part of the slide *B*, which is gibbed to slide crosswise of the press upon the bedplate of the fixture. The slide is moved forward to the tools by the cam *C*, which is on a shaft that extends through the fixture and carries upon its other end the ratchet *D* and also a pawl lever.

The slide is held back with its cam roller in contact with the cam by the spring *E*, so that when the camshaft has made one complete turn, the slide is quickly returned to the starting point as the roller passes over the abrupt drop of the cam face.

The pawl lever derives its movement from the adjustable crankpin in the slotted disk at the end of the press crankshaft—which is standard equipment on all punch presses adapted to the use of a roll feed. A latch, operated by the slide of the attachment holds the clutch of the press in engagement when once the treadle has been depressed, until the device has passed through a complete cycle and the slide returns to the starting point, whereupon the treadle is released and the press stops automatically.

The operator sets a piece of work in the clamp, depresses the treadle once and waits until the press stops of its own accord after having completed the cycle. With the press running at normal speed, the work was gotten out very rapidly and in a perfectly satisfactory manner.

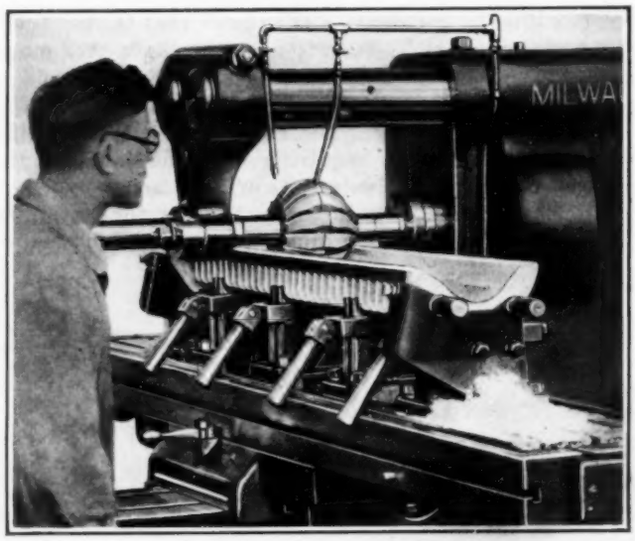
Form-Milling Concaved Work

BY WILLIAM MILLER

For milling the concaved surfaces of aluminum ironing shoes, we had the fixture shown built by the Kearney & Trecker Corporation, Milwaukee, Wis. The casting to be milled was 48 in. long, about 6 in. wide and ⅞ in. thick. While there were transverse ribs underneath, there were no longitudinal ribs to stiffen the casting lengthwise.

Considering the frailness of the casting and the requirements that the milling should leave it straight within 0.003 in. in its length, the problem was not a simple one.

The fixture consists of a series of clamping blocks, each one independently tongued and bolted to the machine table. The center and end blocks contain adjustable hardened pins for locating the casting.



Fixture for milling frail castings

Each clamp block is provided with two sets of floating, serrated jaws, one set for gripping the front of one of the ribs and the other the rear. The eccentric clamp-lever at the front of each block closes both sets of jaws and at the same time draws them against a center plate, holding the casting firmly in place.

Since the gripping takes place under spring tension, releasing the clamp-lever quickly opens the jaws and frees the work.

The work was done on a 3B, plain Milwaukee milling machine having a table 55 in. long and provided with power rapid traverse. The cutter speed was 517 ft. per min. and the feed 16 in. per minute.

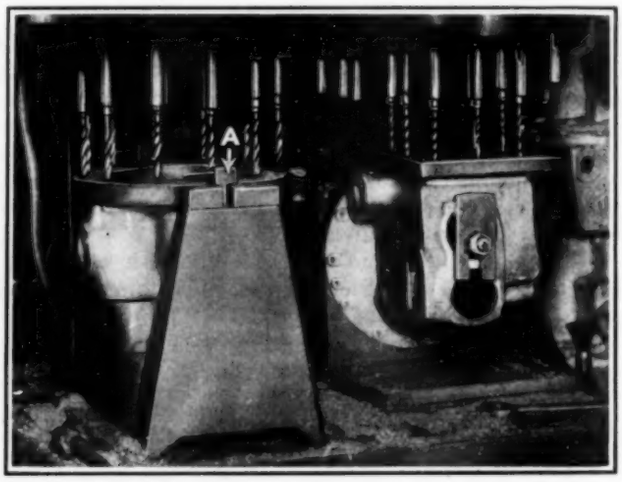
IDEAS FROM PRACTICAL MEN

Simple Fixture for Multiple Drilling

By William F. Sandmann

The illustration shows an arrangement used by a manufacturer of automobiles to drill the bell-end and cover-plate side of the transmission case. The fixtures are neither complicated or costly, but the full capacity of the Natco multiple drilling machine is used efficiently.

The fixture to the left is for drilling the holes in the bell end of the case. The lid of the fixture serves as a



Fixtures for drilling transmission case

hold-down clamp and also as a bushing plate. The quarter-turn hold-down bots at *A* have flatted heads, and at the completion of an operation they are turned so that the lid can be lifted off of the fixture and the case removed. The case is located in the fixture by a short stud in the base that enters one of the shaft bores.

The fixture to the right is even more simple. The case is slipped over a stud and a small locating pin lines it up by entering one of the holes previously drilled in the bell end. Both the stud and the locating pin are flatted on two sides and the sides of the pin and stud are parallel in relation to each other so that the case can be located easily.

The case is first drilled in the fixture to the left, then shifted to the right-hand fixture and another case put in the left-hand fixture. In this manner a case is finished with sixteen holes in two sides at each downward stroke of the head.

Ball Thrusts for Milling-Machine Screws

By Donald A. Hampson

Poor milling-machine work will always result from a loose table, whether that looseness is in the table gib, or the nut, or at the feed-screw anchor. The remedy for a loose table gib is obvious. A worn nut, or one that does not fit the screw well, can be corrected only by a new nut.

End play at the feed-screw anchor must be taken up by washers, or by turning off the shoulder to allow the nut to screw up further. The support afforded the screw at this point is relatively little—a screw 36 in. long rarely has a seat over 1½ in. long, and this with shoulders or collars at each side that rise less than ¼ in. Small wonder then that rapid wear takes place, with the screw running continuously under excessive pressure from the thrust of heavy cuts that must be taken against an inadequate shoulder.

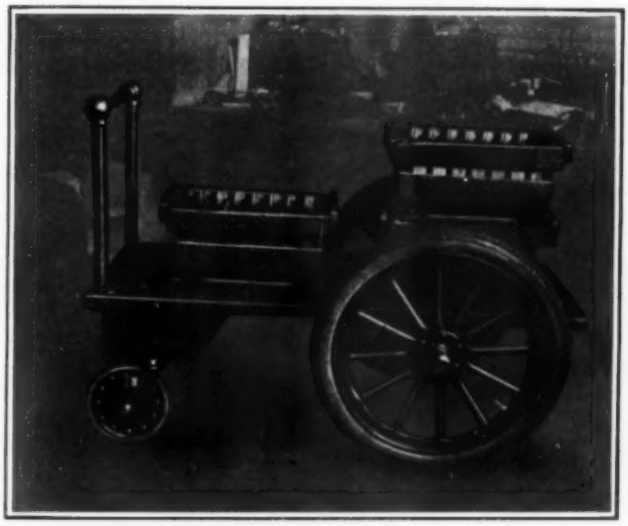
It will be found well worth while to put ball thrust-bearings in milling machines when taking up the play at this point. Bearings for the size of screws ordinarily used, cost from one to two dollars each—a trifling sum, and one that is often less than the cost of making a washer to fit the special location. It has been found that some milling machines have been in constant operation for ten years and the screws have not worn enough to need taking up—but these machines were fitted with thrust bearings of the flat disk type. Bearings having grooved races would have been even better.

Ford Trucks in the Shop

By Henry Densmore

The accompanying illustration shows a truck, one of many in service in the shop of the Remington Noiseless Typewriter Corporation, Middletown, Conn., that has some features not usually looked for in vehicles of this type. It is peculiarly appropriate to this shop in that it, like the product of the shop, is noiseless.

The rear axle is so located with reference to the platform that the greater part of the load comes on the large wheels. The front end is borne by two rubber-tired casters of large diameter, permitting the truck to



Shop truck with Ford wheels and tires

be steered easily through the sometimes tortuous passages between stacks of work, or to be turned around in a very small space when necessary.

The rear wheels, with bearings and pneumatic tires, are standard Ford parts. The truck moves easily, even when loaded to maximum capacity, runs practically without noise, and when repairs are necessary the parts can be procured at any Ford service station.

Practical Shop Problems

Questions of a Practical Nature will be answered in these columns

Standard Data for Taps

Q. Can you tell me where I can find specifications for tap shanks and squares, adopted as standard by the tap and die makers?

A. You will find full information regarding sizes of the parts of taps, on page 883, Vol. 57 of the *American Machinist*. The tables contain data adopted as standard by the Tap and Die Institute.

Running Gears in Oil

Q. In one of our machines we use a steel driving pinion running in a bath of oil. We are considering substituting a pinion made of fiber, bakelite, formica or contex. Can you refer us to the best anthority as to how such gears would hold up in a bath of oil?

A. We believe the best authorities on the matter referred to would be the concerns that make gears of the substances or compounds mentioned. Since they are all reputable concerns, we think you need have no hesitation in accepting their guaranties.

Cold-Rolled Steel

Q. Can you tell me what kind of sheet steel is used for making novelties, toys, and articles of hardware?

It comes in rolls, looks bright and clean and is readily plated and polished.

A. No doubt the steel you refer to is cold-rolled strip steel. It is made in all grades of hardness from dead soft to spring temper.

Special Machinery

Q. Can you tell me where I can get machines for making twist drills, taps and dies?

A. Machines for the manufacture of twist drills, taps and dies are the result of long and intensive development by the makers of such tools and most of them are covered by patents.

We do not know of any such machines on the market.

Pickling Castings

Q. Can you tell us how the scale is removed from castings by pickling?

A. The process of pickling castings is a very simple one. The castings should be immersed in a bath consisting of one part of commercial sulphuric acid and nine parts of water. They should remain in the bath from eight to twenty-four hours, according to the thickness of the scale to be removed. After they have been taken from the bath they should be washed with water.

Since, from your question, you are probably not familiar with the handling of acids, we append the following cautions:

In mixing the bath, be sure to pour the acid into the water. If water is poured into the acid, steam will be suddenly generated, causing explosions and the highly corrosive acid may be thrown about the room. This may result in serious injury to those near the tank.

The tank containing the bath should be of wood and coated on the inside with asphalt or other acid-resisting compound.

When mixing the bath and pickling castings, old clothes should be worn, since it is almost impossible to prevent some of the bath from being splashed on the clothes. In case the acid, or pickling bath should be splashed on good clothing, wet the spots thoroughly with ammonia to neutralize the effects of the acid. Otherwise the clothing will be permanently discolored, and may have holes eaten in it.

In case of slight acid burns on the flesh, apply ammonia. In case of serious burns, apply ammonia and send for a physician at once.

Selling a Patent

Q. I have invented and patented an expanding mandrel that has been successfully used on all around work.

I want to sell the patent. Can you tell me the best way to find a buyer?

A. We would be glad to assist you in finding a buyer for your invention, if we knew how. Patents are entirely out of our line, and the only suggestion we can make, is that you put your patent in the hands of a reliable patent broker.

The patent attorney who put through your claims, probably has a list of agencies through which patents are bought and sold.

Coining Presses for Forgings

Q. I have heard that automobile manufacturers are using coining presses for a second operation on drop forgings, in order to bring the forgings closer to finished size, and to render less machining necessary. Can you tell me anything about it?

A. Coining presses are being used in the automobile industry for finishing some of the comparatively simple, drop-forged parts.

You will find an article on the subject on page 685, Vol. 61, of the *American Machinist*.

Close Limits in Tapping

Q. We have attempted to machine-tap nuts within the limits prescribed by the American Engineering Standards Committee, but have not obtained satisfactory results.

Can you tell us where our trouble lies and what we should do for successful results?

A. Your trouble is in the use of taps that are not accurate enough. You should use taps ground to the proper pitch diameter and lead, after they have been hardened.

Technical Abstracts

Management Education

There is considerable difference of opinion among teachers of management as to whether the course should be given with an engineering background through the engineering department of the universities or colleges, or whether it should be given with a business background through the commercial department.

Edward A. Filene states that as society develops, the pioneer must always be succeeded by the engineer—the business man of tomorrow must have an engineer-mind. If there was ever a time when business men were obliged to think scientifically in order to succeed, it is now. This explains the consensus of opinion that is in favor of having the young man brought in touch with teachers having the engineer background, point of view and technique.

Joseph W. Roe, Professor of Industrial Engineering, New York University and Nathaniel G. Burleigh, Professor of Industrial Organization, Dartmouth College, contribute a paper to the Taylor Society expressing the various view points. They state that business executives are coming to recognize that the ultimate and permanent purpose of industry is the efficient production of goods and service and this has drawn them into the engineering field and into the use of engineering methods for analyzing and testing. So far the chief contributions to management have come from the engineers. *The Transactions* of the American Society of Mechanical Engineers contains the most important contributions to the science of industrial management. Contributions from the economists, business men and bankers have come later and have been less dynamic. In the field of education, however, the schools of commerce took up a course in business administration earlier than did the Engineering College and we are facing an overlapping of the subject by the two departments.

The two authors concur in the belief that there should be at least two different types of curricula, one an engineering course, broadened on the business and executive side, the other a course in management, with some instruction in the engineering field. They both add that in order to acquire the proper knowledge of management, there should be a knowledge of human nature which can only be acquired under actual working conditions, working for real pay among real workmen. This contact is much more effective if it is acquired during the educational process as it gives a meaning to the studies, vitalizes the students' interest and obviates much of the painful readjustment so common after graduation.

This article goes into considerable detail and discussion on the subject by various educational authorities.—*Bulletin of the Taylor Society*, February.

The Stroboscopic Determination of Speeds and Frequencies

There is a host of methods whereby the speed of rotating machinery and the like can be determined, but in this article G. E. Moore describes the stroboscopic method and instances several of its application and also shows the machines for carrying out the determination. The effect involves the comparison of unknown speeds with known speeds through a specially actuated shutter or similar device.

One variation of the stroboscope called the Oscilloscope has a "creeper gear" attached to the instrument so that the observed machine is made to appear to operate at a definite fraction of its actual speed, giving in fact, a similar result to that seen by very slow motion photographs. The advantages of the system are summed up as being capable of giving a high degree of precision with an accuracy of one-tenth of one per cent. The speed range is practically indefinite and instantaneous speed determination is possible. Hunting and cyclic irregularities are observable and capable of study. No load need be placed upon the rotating part under test.—*The Engineer* (England), Feb. 20, p. 209.

The Scrap Problem in the Small Plant

Richard Cragin Daniels, of the Ternstedt Manufacturing Co., (General Motors organization) discusses at some length the problem of profitably disposing of the scrap accumulating in a small plant. He particularly warns managers of such plants against the depredations of the average junk dealer, pointing out that this man is very often unscrupulous and will take advantage wherever he can.

Mr. Daniels states that it requires a great deal of effort and thought before profit begins to materialize from the selling of scrap, but that progress can be made by properly classifying scrap, which may be divided into three major classes: steel and iron, non-ferrous metals, and non-metallic.

This article covers only steel and iron. Specifications are given for heavy melting steel, hydraulic compressed sheet, machine shop turnings and short shoveling turnings, as well as heavy breakable cast, cast iron borings, busheling and loose sheets. A complete list of the different classifications can be obtained from any steel mill.

The first step to be taken is to obtain the freight rates on scrap steel for remelting purposes from the factory to any of the points quoted as purchasing points. An analysis will show which is the most suitable shipping point for the particular grade of scrap. A specific plant is then taken in detail, this plant being capable of turning out about 3 tons a day of loose sheet from punch presses, about 1 ton a day of machine shop turnings from screw machines, etc., and about 1 ton a day of No. 2 busheling from punch presses.

One of the most important points is to furnish means of car loading of scrap in such a way as to obtain a minimum of handling. Another thing that is necessary is to weigh the scrap very carefully to avoid any deliberate errors being made on the part of the scrap dealer.—*Factory*, March, p. 414.

American Machinist

Established 1877

KENNETH H. CONDIT AND FRED H. COLVIN, *Editors*

An Indictment of the High Schools

IF THE first progress report, just published, of the committee investigating engineering education is any indication of the type of final report we are to expect from it, its future work will be watched with interest. Stated baldly, its conclusion is that the average high-school graduate headed for an engineering school is not as well prepared as was his older brother ten years ago. As a result the percentage of an entering class that will graduate four years later is steadily dropping.

One educator, in replying to the committee's questionnaire, points out the fact that ninety per cent of the present day high-school graduates do not go to college. The schools are naturally shaping their curricula to care for the ninety per cent, which is well enough except that the ten per cent, the ones that will go on to college and engineering school and among whom are likely to be the best brains of the rising generation, are not given the preparation they should have.

It is interesting to get this criticism of the secondary schools from college professors because in some respects it is singularly like the criticism of employers and trade trainers. Both object to the smattering of ill-assorted information with which the average student emerges, most of it practically useless so far as real mental training is concerned. It is a natural result of trying to teach too many subjects.

If the committee does little more than bring out the shortcomings of the secondary schools and lead the way to their remedy it will have done a real job.

Used Machinery Has Its Place

USED or rebuilt machinery is a live question in the machine-tool field at present. And there are many ideas as to policies, ethics and all the other phases that enter into it.

The builder only sees that if there were no used machines to be bought, he might sell more new machines. He feels that if his agents would not handle used machinery, they could sell more new ones.

The agent, however, points out that in order to sell new machines it is frequently necessary to buy the old machines that are being replaced. He also knows that many of his customers are job shops where large production problems do not enter. And, further, that if it were not for these markets for used machines the new machines that replaced them would not have been bought.

Builders of machine tools take a justifiable pride in the amount of service their machines render. They would be insulted if you intimated that they will only last a couple of years. And while they would like to replace them frequently they do not resent the original buyer getting several years' use out of them. Yet, when the original purchaser decides to put in new equipment, whether the machine he replaces has been in use two years or ten, they feel that the old machine becomes a menace and ought to be scrapped. And this in spite of the fact that without the sale of the used machine by the dealer, the order for the new one that replaced it would not have been forthcoming.

There is another angle to the situation, and it resembles the automobile problem in many ways. Thousands who have become motorists by buying a used car, have later purchased new cars. In the same way many small shops, starting with little capital, have bought used machines and later become buyers of new machinery.

It should be thoroughly understood that, in most cases, the ability to sell a used machine makes it possible to buy a new one. If there were no way of getting some return on machines that have seen service, the demand for new machines would be very much less. No matter how much we may want to sell new machines, we must remember that economic laws cannot be ignored.

The Names of Things

ON ANOTHER page, in his article "Boss, Pad and Spigot," R. E. Marks has again brought up the question of standardized names of things for the shop. He has touched on the common terms of pad and boss, also bringing in the less used term of spigot.

It should be remembered that before deciding on the name to be used as standard, several points are to be carefully considered. The main point is that a name be chosen that will be used as universally as possible. The name should be logical and descriptive, if such a name can be secured. But logic is secondary to universality. If, for example, it is considered that boss and pad should both be used, the exact use of each should be carefully designated, and they should not be used interchangeably.

There are hundreds of other shop terms that are confusing and need standardizing. And while logical and descriptive names are more desirable than those chosen arbitrarily, the main thing is to decide on names that will be used and insist that they be adhered to. Failure to know just what the other fellow means causes more delay and expense than many realize.

Shop Equipment News

Murchey Automatic Double-End Threading Reaming and Drilling Machine

The Murchey Machine & Tool Co., 952 Porter Street, Detroit, Michigan, has developed an automatic air controlled machine that will perform threading, reaming, chamfering and drilling operations on both ends of pipe nipples, studs, piston pins, and similar parts simultaneously. It is belt connected to its source of power for driving tools but all material handling and feed movements are controlled by two double-acting pneumatic cylinders. One of these cylinders actuates the heads and the handling device, and the other controls the chuck movement. The cylinder operating valves are cam-actuated and are so arranged that air can be admitted and exhausted in varying amounts, thus regulating and cushioning the individual movements.

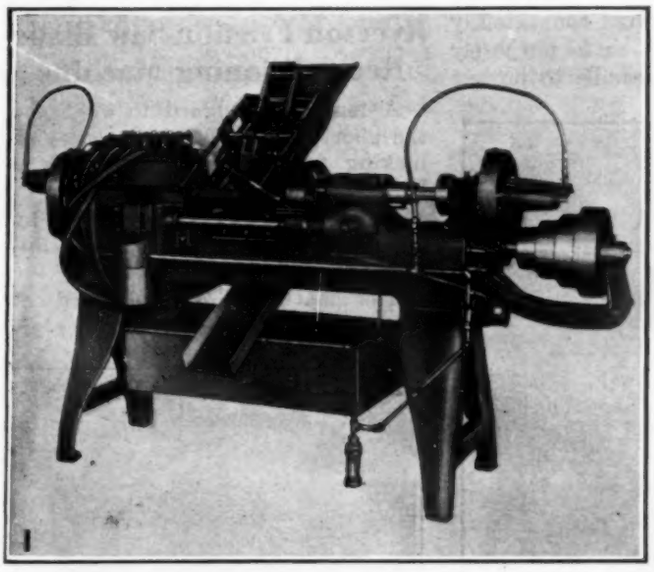
A hopper is located above the machine and is designed to feed to a chute which is adjustable for height and width. Automatic fingers pick the pieces from this chute to bring them into position between the chuck jaws. The chuck drops them into a delivery chute below the machine when they are completed and a container is provided for chips and cutting oil below this delivery chute.

Front and rear views of the machine are illustrated in Figs. 1 and 2 respectively. A cone pulley mounted on the right-hand end, Fig. 1, drives a main shaft which extends the length of the machine and is geared to the two hollow tool spindles and the valve camshaft which is mounted on the top of the frame at the left-hand end. A pump, belted to the frame at the right-hand end, picks up the cutting oil from the chip pan and pumps it through the spindles to the tools where it acts to clear the cutters of chips as well as to cool the work. Metal hoses connect the pump flexibly to the spindles and valves are provided to regulate the flow. A trap on the bottom of the pan, located so it can be easily cleaned out, separates any small particles that get by the suction strainer and maintains a clean oil supply.

The cylinder that controls the pick-up fingers and the feed movements of the heads is mounted vertically on the front of the machine below the valve cam assembly. Its motion rotates a shaft which is bevel geared to the spindle racks and also rotates a rocker arm to which the pick-up fingers are attached. The movement of this shaft besides bringing a new blank into position actuates an escapement in the feed chute to admit the next blank.

The chuck - control cylinder is mounted horizontally, Fig. 2, on the rear of the machine to grip and release the blanks. In this view the slides that close and open the dies for cutting threads are shown on the spindle housings together with their limiting screws on which they slide. The travel of the spindles and the speed of a complete cycle of operations is determined by the speed set on the valve camshaft.

The spindles have a maximum travel of 1½ in. and a variation of speeds between 63½ r.p.m. recommended for the slowest and 382 r.p.m. maximum. A maximum of 1 in. of threads can be cut on pieces that range in length from 3 in. to 9 in. The machine will handle work from ⅜ to 2 in. in diameter by 3 to 9 in. long. It occupies a floor space of 22½ in. x 94 in. and weighs 2,000 lb. net. The input to drive is approximately 3 horsepower.



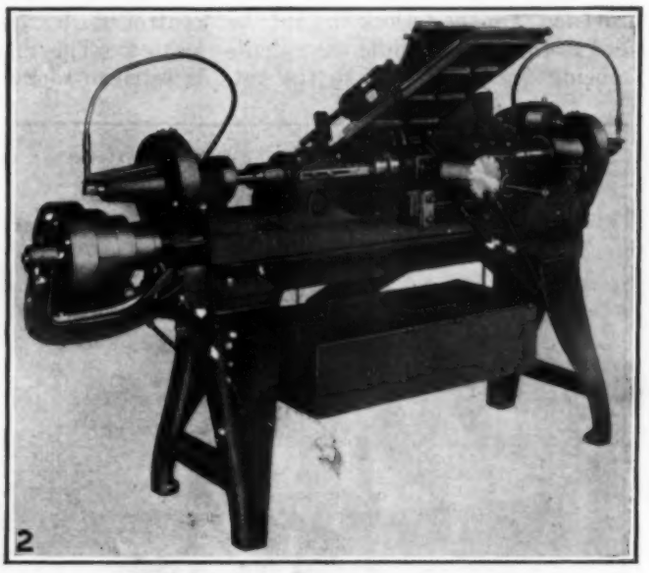


Fig. 1—Murchey Automatic Double-End Threading Reaming and Drilling Machine. Fig. 2—A rear view showing the chuck-control cylinder

SHOP EQUIPMENT NEWS

Pratt & Whitney Jig-Boring Machine Improved Design

Several changes have been made in the design of the jig boring machine manufactured by the Pratt & Whitney Co., Hartford, Conn., chief among which are the heavier column and column head, the more compact spindle-speed gear box, the larger spindle head, and the simplified and strengthened measuring devices.

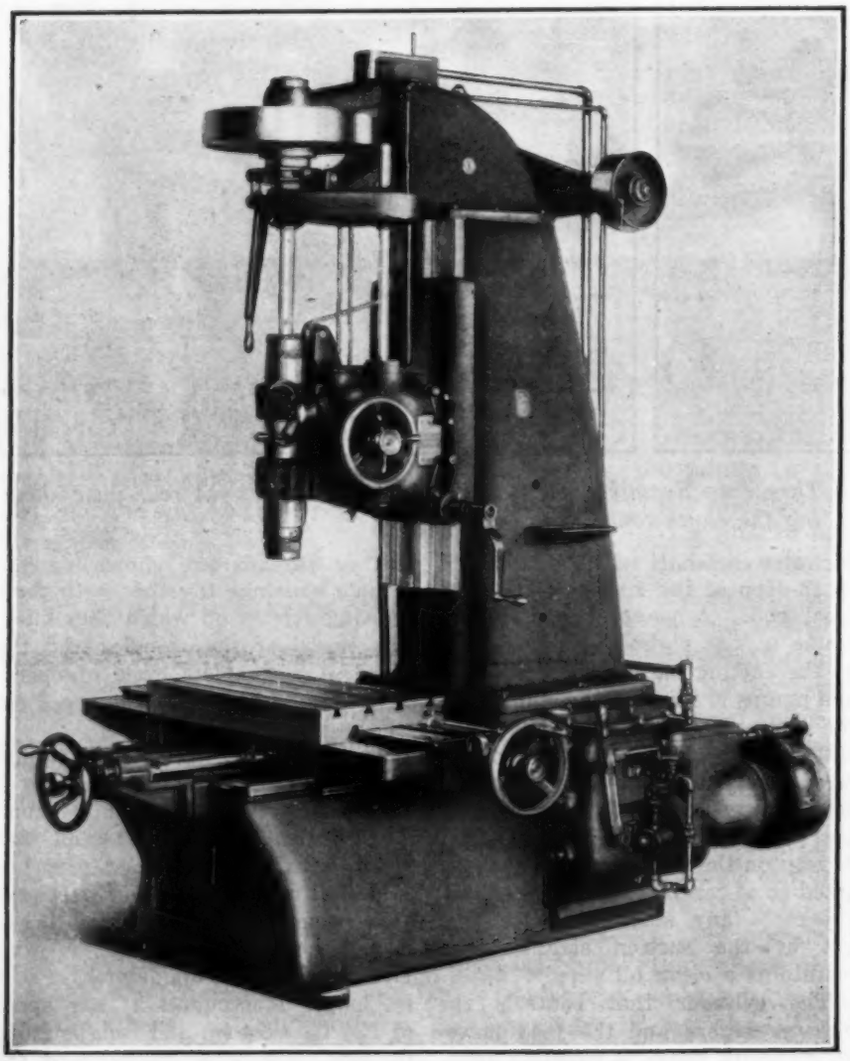
The machine is intended to perform operations in the manufacture of jigs where very close limits of accuracy are essential and where the cost of the work must be kept within reasonable limits.

To hold within these close limits provision is made to lock the spindle head to the column while the spindle is being fed down to take the cut. The work table is accurately scraped on the top and four sides and is provided with gages consisting of a combination of end measures, an inside micrometer and an indicator dial that show respectively even inches, thousandths and ten-thousandths of an inch.

To obtain the speed commensurate with reasonable cost of production the table is equipped with hand feed and rapid traverse in both directions; there are eight spindle speeds ranging from 22.2 to 300 r.p.m., and four feeds from 0.0025 to 0.010 in. per spindle revolution which are controlled by levers conveniently located. The machine is purposely belt-driven to the spindle to protect it by thus limiting the available power.

In operation the spindle is established accurately over the first hole to be bored using either a proving bar or a button. The combination of measuring devices are then used to bring the next hole into exact position in a minimum amount of time using right-angle dimensions.

The table measures 16 x 30 in. and has a longitudinal travel of 24 in. and a traverse limit of 18 in. It occupies a floor space of 5 ft. and 10 in. by 7 ft. and 1 in., and stands 8 ft. and 10½ in. high. It can be either direct connected to drive the spindle belt or can be set up to a counter or a line shaft

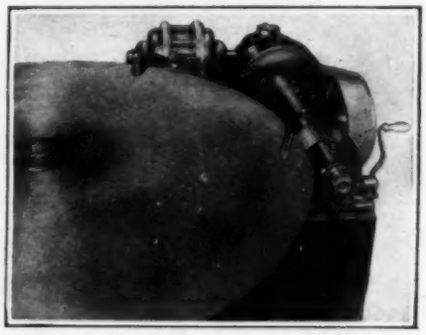


Pratt & Whitney Jig-Boring Machine, Improved Design

Ryerson Friction-Saw Blade Reconditioning Machine

A machine designed to overcome the shortcomings of the process of nicking friction-saw blades with a hammer and chisel by way of sharpening the saws has been developed by Joseph T. Ryerson & Son, Inc., Chicago, Ill.

The machine, as illustrated at work on a saw, consists of a centering and leveling frame which holds the blade, a milling and serrating hob that revolves it, cuts the grooves and trims the rim, and a pair of milling cutters, one on each side of the blade, that cut off the mushroom effect left on the teeth by the hob.



Ryerson Friction-Saw Blade Reconditioning Machine

The hob and cutters are designed and made of the correct material to take care of the reconditioning without regard to the condition and nature of the material in the saw blade. The company proposes to establish a reconditioning service at a moderate charge from each of its seven plants for saw owners.

SHOP EQUIPMENT NEWS

Gleason 25-In. Spiral Bevel Gear Generator

The Gleason Works, Rochester, N. Y., has extended the range of its line of spiral bevel gear generators by the addition of the machine illustrated. It will cut gears having a maximum cone distance of 16½ in., which includes 8 to 1 ratio gears that are 32¾ in. in diameter, 3 to 1 ratio gears 31.2 in. in diameter, and 2 to 1 ratio gears 29½ in. in diameter. Besides gears for industrial purposes, the product of the machine is used in railways, motor cars, auto buses, trucks and similar equipment.

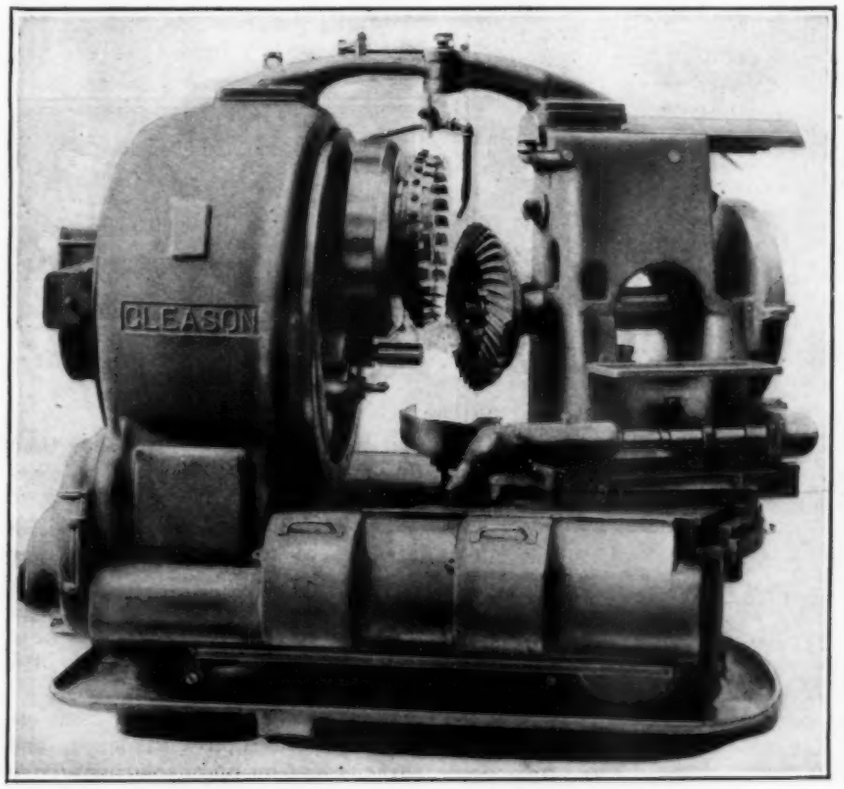
A number of improvements have been incorporated in the construction such as the overhead strengthening tie and the completely inclosed housing for the cutter cradle which increases the rigidity of the machine to offer adequate back-up for heavy work.

The stop-wheel type of indexing mechanism has been adapted, but since the index change-gears are in the constantly moving train that drives the generating movements, there are no dead gears, thus eliminating the possibility of backlash becoming a limiting factor for accurate indexing and tooth profile.

The cutter spindle is designed so that end play or radial looseness can be adjusted out independently, and without dismantling the spindle assembly. Lubrication is self-contained for this spindle and built to exclude dirt from the bearings.

Change-gear trains are used for the generating-roll ratio, the ends of which are wormwheels constructed and cut to maintain a close degree of accuracy. Cutters 9, 12 and 18 in. in diameter can be used. A diametral pitch of 1½ in. is rated as the maximum capacity.

With the exception of the cutter spindle a unit lubricating system supplies all points on the cutter head and another is provided for the work spindle. A geared pump supplies cutting lubricant under pressure. The machine is driven by a 7½ hp. constant-speed motor arranged and furnished to specifications. It weighs approximately 14,000 lb. net.



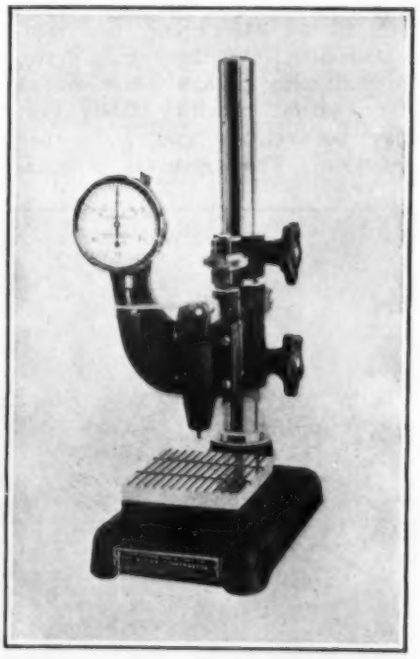
Gleason 25-In. Spiral Bevel Gear Generator

Active Rapid Part-Inspection Gage

The gage illustrated is being built and marketed by the Active Machine & Tool Co., 1220 West Sixth St., Cleveland, Ohio. It is intended for production inspection of parts up to 6 in. in diameter.

A dial indicator is mounted on an arm that is adjustable on a vertical column and is actuated by a small 10 to 1-ratio lever which in turn communicates to the piece being tested through a spindle that is set in the arm above the table. This spindle is hardened, ground and lapped.

The dial is calibrated in ten-thousandths of an inch which represents ¼ in. of movement of the pointer. It can be set to zero for a given test-size by first loosening the clamp on the column and moving the arm down to an approximate position, then turning the adjusting nut to bring the reading close to zero and by finally turning the dial to get exact position.



Active Rapid Part-Inspection Gage

The table of the gage is 3⅝ x 3½ in. and measures 3⅞ in. from its center to the column. A V-block attachment is furnished for cylindrical parts and a wrist-pin attachment is provided for testing parallel, cylindrical and diameter dimensions simultaneously.

SHOP EQUIPMENT NEWS

Brightman Shafting-Turning Machine

A number of improvements have been incorporated in the design of the machine illustrated by the Brightman Brothers Co., 773 Markinson Ave., Columbus, Ohio. It is being built and marketed as an addition to the company's line of shafting-turning equipment.

The machine is driven by a constant-speed motor which is furnished as regular equipment, mounted as illustrated in Fig. 1, and transmitting power by Link-Belt chain through a drive-gear shaft and system of change gears to the main spindle. This spindle rotates on Guerney radial-thrust bearings with provision for wear take-up. Speeds from 45 to 345 r.p.m. per min. are available. Another chain drive, equipped with change gears and a safety worm, provides feeds that range between $\frac{1}{16}$ and $\frac{3}{8}$ in. per revolution. Feed reversal is made possible to aid when setting the cutting tools. The automatic gripping and feeding mechanism at either end of the machine is designed to compensate for irregularities in hot rolled stock. Controls are arranged conveniently. An independent motor-driven Fulflo pump supplies cutting lubricant at 35 gal. per min. to start flooding the tools before work commences.

The toolhead is illustrated in Fig. 2. It is arranged so one, two or four tools may be used. Two heads of each size cover the range of machine sizes of which there are three, $\frac{1}{2}$ to 2 in., 1 to 4 in. and 2 to 6 in. The 1 to 4-in. size is illustrated. A crane is provided for handling the heads.

The machine occupies a floor space, on the two larger sizes, of 5 ft. and 6 in. wide by 16 ft. long by 8 ft. and 6 in. in height. It will handle lengths to a minimum of 8 ft., the production varying according to the class of stock in question, feeds and speeds being set to the limit of tool capacity.

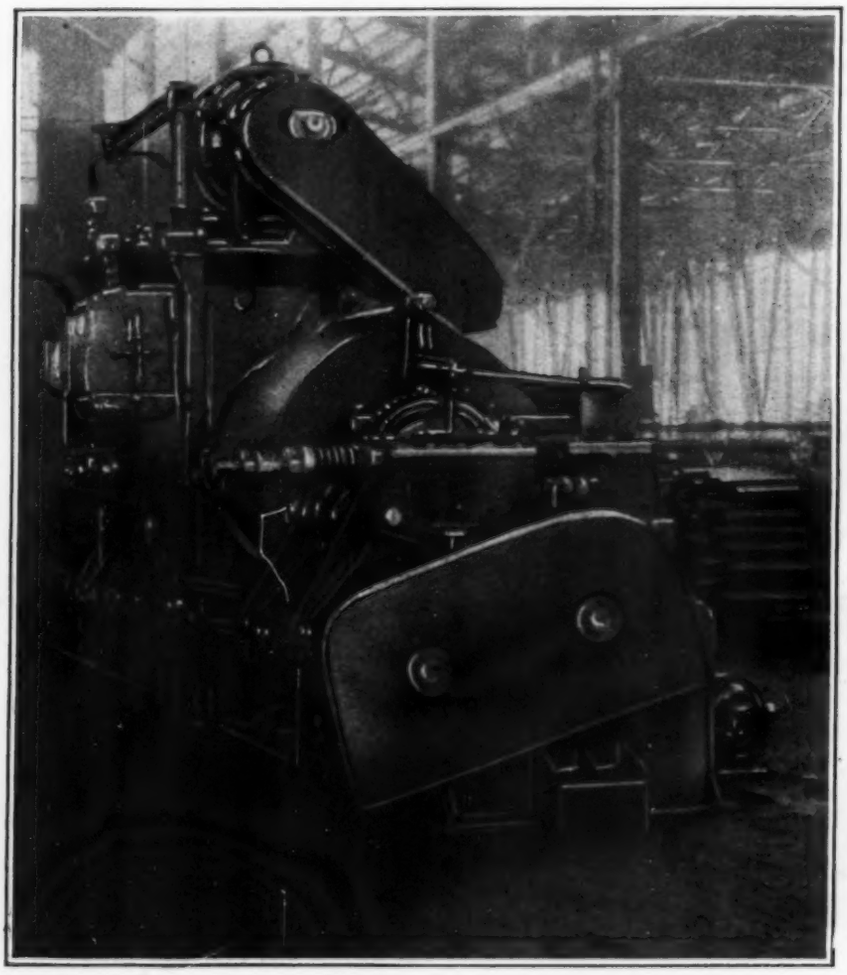


Fig. 1—Brightman Shafting-Turning Machine

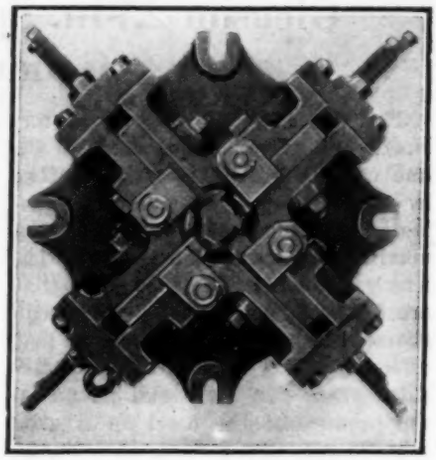
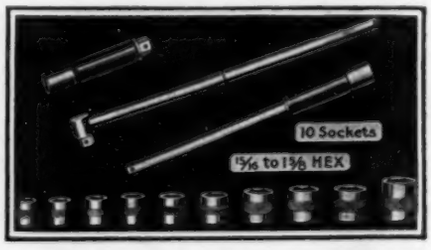


Fig. 2—One of the toolheads

Husky Heavy-Duty Wrench Set No. 120

The Husky Wrench Co., 928 Sixteenth Ave., Milwaukee, Wis., has added a heavy-duty set to its line of socket wrenches which were previously described on page 252, Vol. 61 of the *American Machinist*. The No. 120 set is intended for use primarily in the industrial rather than the automotive field which is covered by the original design.



Husky Heavy-Duty Wrench Set No. 120

The set consists, as illustrated, in a series of ten sockets that range from $\frac{15}{16}$ to $1\frac{3}{8}$-in. hexagon, and includes three styles of handles, offset that will slide to position to make a tee, a swivel extension piece, and a short grip.

The parts are machined from selected bar stock, are hardened, and rust-proofed by nickel plating. They carry a service guarantee by the makers.

SHOP EQUIPMENT NEWS

Taylor & Fenn Spring Presses Nos. 11, 1 and 0

Three types of spring presses have been developed and placed on the market by the Taylor & Fenn Co., Hartford, Conn. They are intended for work such as staking, riveting, embossing, piercing, stamping, and similar operations where a comparatively light, uniform blow is required.

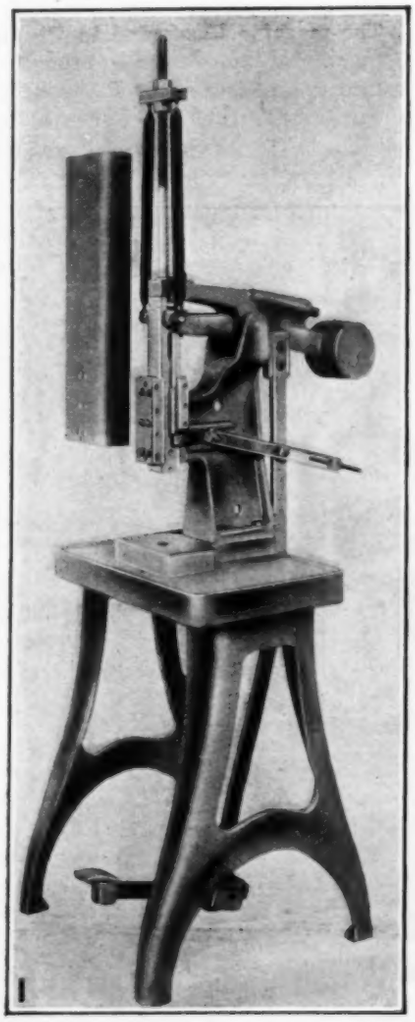
Press No. 11, which is double acting, is illustrated in Fig. 1. It is regularly equipped with two 50-lb. springs, but the hold-down pad and tools are made to suit the work by the user. Press No. 1, illustrated in Fig. 2, is single acting and is regularly furnished with a 75-lb. spring. On both machines, however, this spring is furnished heavier or lighter to specification by the customer.

The machines are similar in their method of operation, except that the No. 11 press has a hold-down sleeve which comes down around the ram with the motion of the pedal to hold the work in place before the ram is released.

Depressing the pedal stretches the spring to a predetermined point, depending on the setting of a latch that releases the ram and allows the spring to contract and force the ram down to make a hit.

The No. 0 press has points in common with both of the other styles. One spring is regular at 30 lb., and a hold down is provided for the work. The frame of this type is arranged for bench mounting.

Strokes on the Nos. 11 and 1 are adjustable between ½ and 2¾ in., bed to ram is 7¼ in., working surface on bed is 9½ x 5 in., floor space occupied is 24 x 34 in., and the net weights are respectively 435 and 410 lb. The corresponding dimensions for the No. 0 press are as follows: stroke ½ to 2¾ in., bed to hold-down sleeve 4¾ in., working surface on bed 5 x 8 in., and net weight 85 pounds.



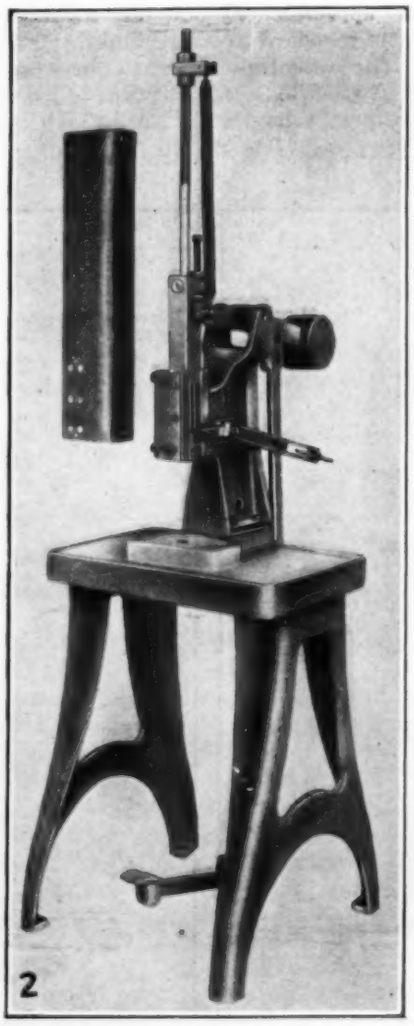
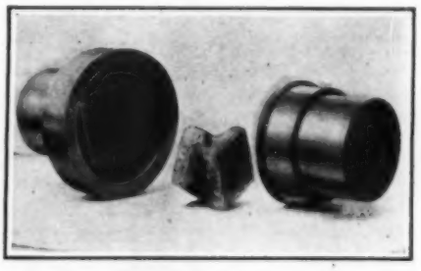


Fig. 1—Taylor & Fenn Spring Press No. 11. Fig. 2—The No. 1 type

H & O "Whitney" Free-Floating Coupling

The H & O Chain Co., South Norwalk, Conn., has taken over the manufacture of the coupling formerly made by the Kay Mfg. Co., and is now prepared to supply the market in sizes ranging from fractional horsepowers to 3,000 hp., the power rating being based upon a rotative speed of 100 r.p.m. The couplings are made heavier than formerly and the transmitting link has been shortened.

The design of the coupling is such that the power is transmitted through a peculiarly shaped metal link made of steel in the smaller sizes and of a special grade of nickel-iron in the larger sizes, that permits angular displacement of the connected shafts up to 15 deg. and allows an end-float varying from ⅛ to ¾ in. according to the size of the coupling. The action is analogous to that of a universal joint but is without the multiplicity of parts necessary to the latter. There is no distortion of the link in action and consequently no fatigue of metal.



H & O "Whitney" Free-Floating Coupling

The couplings are made regularly in six types to meet different conditions. The sizes are based upon the bores which range from ⅜ in. to 11½ in. in diameter. The standard couplings have parallel bores and keyways. Couplings with tapered bores and various arrangements of keys and setscrews can be furnished.

SHOP EQUIPMENT NEWS

Krause Testing Machines

A hydraulically-operated material-testing machine, designed for use in tension, compression, bending, shearing, punching and Brinell determination, is being built and marketed in two styles by Ernst Krause & Co. A-G., xx./2 Engerthstrasse 151, Vienna, Austria, represented by F. W. Jaeger, 140 Liberty St., New York, N. Y., in the United States. Glycerine is used for the pressure medium.

The work-heads float free laterally to facilitate centering the work and to guard against compound stresses. All knife edges and delicate points in construction have been eliminated to enable the machine to give accurate results continuously at its capacity which is rated at 40 tons.

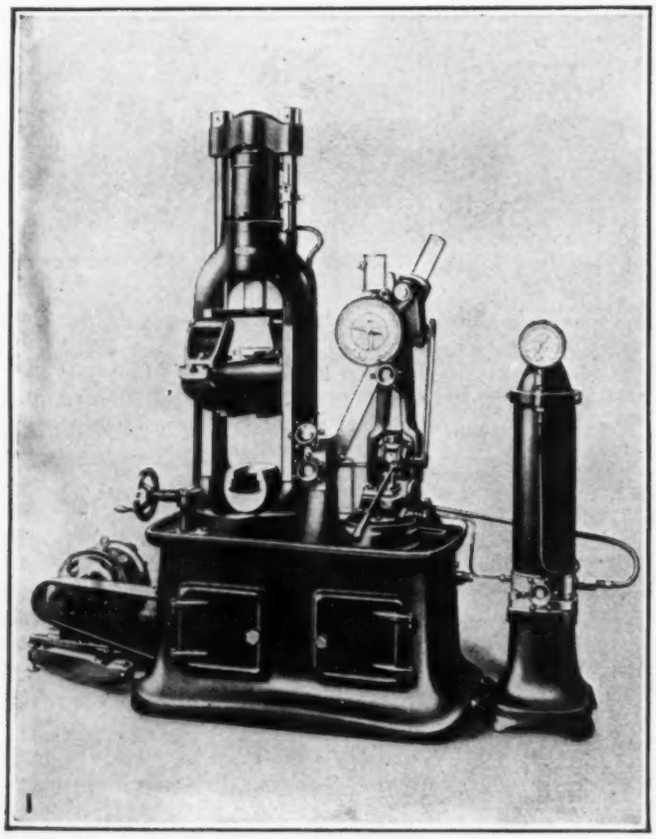
Regular equipment includes the machine with hand-pump and gage assembly in two styles, as illustrated, with the attachments and fixtures for tension, compression, bending and Brinell determinations. Motor-drive to the pump, the accumulator and other special fixtures are available to customer's specification.

The pump is compounded and a lock is provided to give two capacity ratios to the lever movement for rapid approach to, and close action at, the critical points of the test. A tank in the base holds the supply of glycerine that is not in the system. The motor when used connects to the pump through a mechanism inside the base, and when the accumulator is specified the system is piped to bring this piece of equipment between the pump and the work-pressure cylinder. Valves are provided so the pressure in the accumulator may be cut off from the cylinder, admitted in regulated amounts or rapidly turned on full depending on the action desired in the test. An initial pressure is set up in the accumulator by admitting an inert gas at approximately 50 atmospheres from standard pressure tanks.

The essential difference between the two styles lies in the type of gage equipment used. In Fig. 1, which shows one style set up for bending, this gage is of the pendulum type designed to eliminate the use of all springs. A counter-weighted arm is pivoted at one end and attached to a piston resting on the pressure medium within a cylinder on the gage column. Its motions control the action of a calibrated dial indicator and a marking pen mounted on a recording cylinder at the top of the column. The rotation of this cylinder is actuated by the movements of the work head, so a stress-strain curve can be recorded for the test, or a record made of the sequence of steps taken in any determination.

When a liquid is used under pressure to move a piston there is always a certain tendency to lag when going from rest to motion. To obviate this tendency a small motor is mounted in the gage column and connected through belt and gearing to the piston to keep it in continuous motion.

The machine illustrated in Fig. 2 is equipped with three standard spring gages, one reads to 5,000 lb. and the other two are calibrated to 80,000 lb. The low-pressure gage and



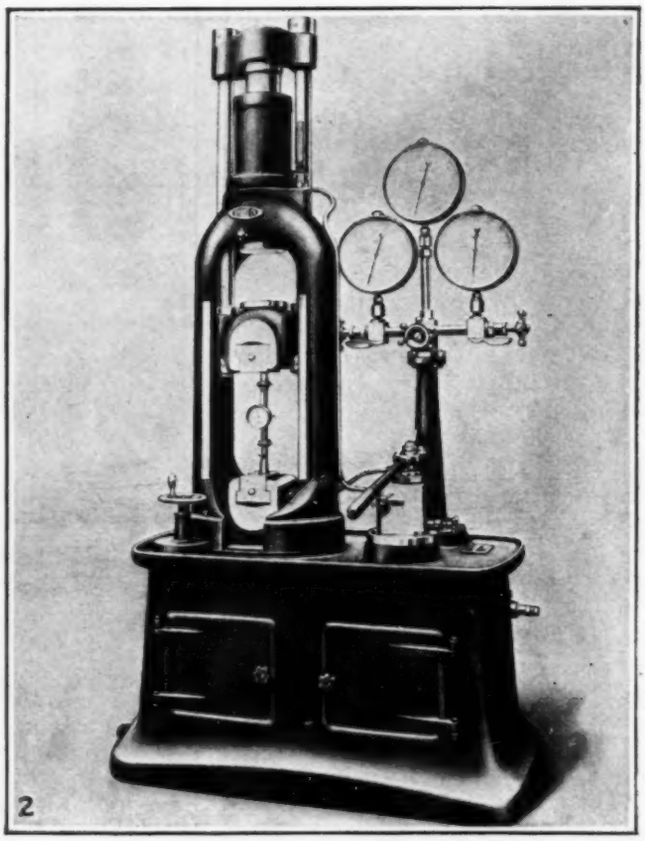


Fig. 1—Krause Pendulum-Gage Testing Machine. Fig. 2—Krause Spring-Gage Testing Machine

SHOP EQUIPMENT NEWS

one of the pair for high pressure are used for the test while the other one is provided as a means of checking accuracy.

A dial attachment for indicating reduction of area on the test piece is shown set up in Fig. 2. The readings possible with this instrument will give closely approximate results. For extreme accuracy, however, the attachment shown in Fig. 3 is recommended. The makers guarantee the machine to maintain a limit of acuracy of one per cent in any of the test determinations and are prepared to furnish it to specification for half that amount. The spring-gage style weighs 2,000 lb. net and the other approximately 2,500 pounds. Since the machine is sufficiently rigid and self-contained no foundation is required.

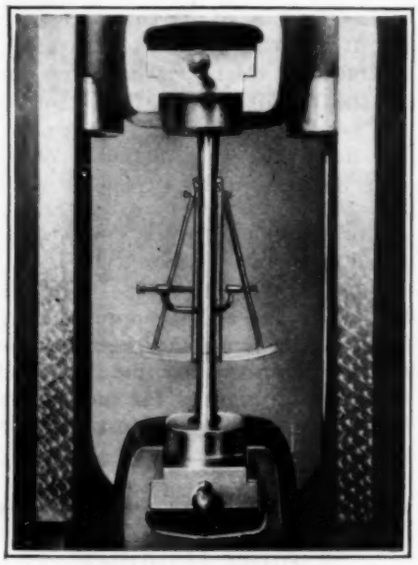


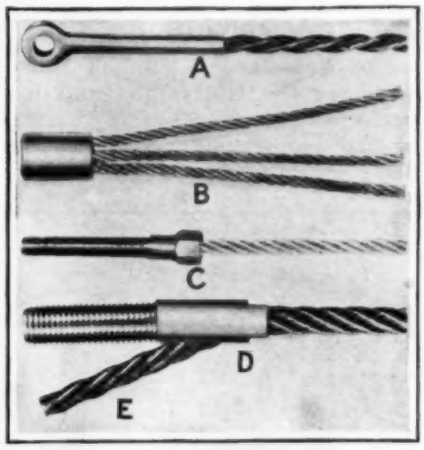
Fig. 3—Area reduction recording instrument

American Tru-Lay Wire Rope and Tru-Loc Fittings

The American Cable Company, 105 Hudson Street, New York, N. Y., has made a number of developments on the manufacture of wire rope and rope fittings that are said to present definite advantages.

The principal change in the manufacture of the rope lies in preforming the wires and strands to the shapes they will take in the completed rope, thus setting up a resistance to unstranding that makes it possible to cut and splice at any point without the necessity of seizing the ends. The preforming is said to further result in the broken wires on the outside lying flat instead of fraying out to make handling difficult and to increase the wear on sheaves and drums; in an even distribution of the load to individual strands and wires that obviates any tendency to high strand in actual use; and in making it possible to use the Lang lay rope in the place of regular lay.

The Tru-loc fittings have been developed to make all of the strength of the Tru-lay rope available. They can be used only on account of the fact that it is unnecessary to seize the ends as they otherwise could not be applied. These fittings, a number of which are illustrated, consist of a steel sleeve which is slipped over the smooth unseized end of the rope and then put in a specially designed press and forced to contract around the rope and into the recesses between wires and strands so all are gripped securely. At *D* in the illustration one of these fittings is shown in place, and at *E* a phantom view of the same fitting shows the rope inside. These fittings can be threaded, equipped with various heads for wrenches, or fitted with eyes or hooks or turn-buckles. As shown at *A*, a flat-head eye end has been fitted over a rope having certain strands removed; at *B* three separate rope ends are gripped in the same fitting, and at *C* a hexagon fitting is in place. The rope and fittings are available for use in every industry where wire rope is adaptable.

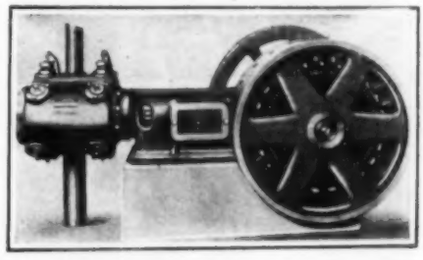


American Tru-Lay Wire Rope and Tru-Loc Fittings

Chicago Pneumatic Air Compressor Class N-SE

The principle feature of the line of air compressors which the Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y., has added to its other lines of similar equipment, lies in the integral design of flywheel and synchronous driving motor.

The ordinary location and contour of the rotor has been taken for the stator which is mounted in a cradle support secured to the compressor frame, and bored concentric with the compressor bearing. The rotor poles are mounted on the inside rim of the overhung flywheel which is crowned on the outside to belt-drive an exciter or other auxiliary.



Chicago Pneumatic Air Compressor Class N-SE

To obviate possible trouble resulting from wear due to the small air gap necessary between stator and rotor, the former has been designed with an upward magnetic pull to relieve the weight of the rotor on the compressor bearings floating it in effect. In addition the bearing bushings are of the precast and finished design to make them inexpensive and readily replaceable as soon as any appreciable wear occurs.

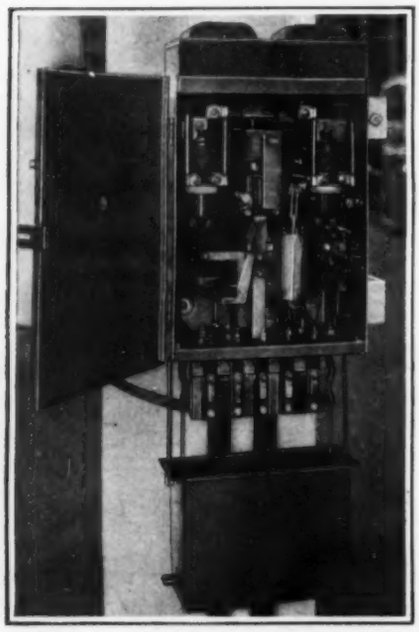
This construction is said to lessen the floor space required for a similar size line-shaft driven machine and to save from thirty to seventy-five per cent of that needed for the short belt-connected type depending on the design of the latter and the unit sizes.

The company is prepared to furnish this compressor for pressures between 100 and 125 lb. and from 139 to 1,000 cu.ft. per min. displacement.

SHOP EQUIPMENT NEWS

Crocker-Wheeler Automatic Remote-Control Starter

There are a number of interesting items from the standpoints of operation and safety which have been incorporated by the Crocker-Wheeler Co., Ampere, New Jersey, in the line of automatic starters it has developed and added to its other products. The equipment is intended for starting and running service



Crocker-Wheeler Automatic Remote-Control Starter

with two and three-phase squirrel-cage induction motors and can be located out of the way for push-button control, convenient to the operator.

Such points as making and breaking all contacts under oil, adjustability for time and load setting, positive time adjustment between starting and running positions, and accessibility of wearing parts for inspection or replacement have been featured as a basis for uninterrupted service.

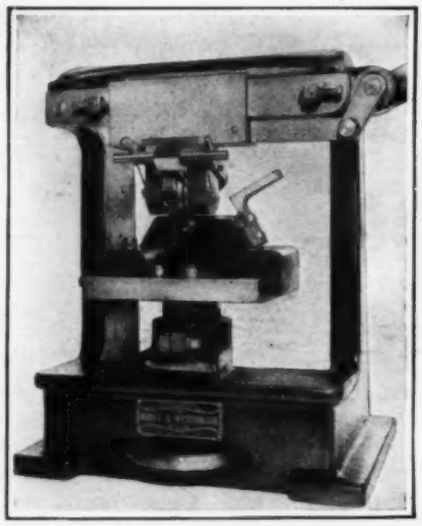
Safety has been considered by designing a trip mechanism which is operated by opening the door to cut all electrical connections to the contact board leaving it dead. An interlock between the door and the oil tank prevents the latter from being lowered until the door is opened and the cutout mechanism tripped.

Two auto-transformers are mounted on top of the case and are equipped with the proper voltage taps for the starting period. In the main part of the starter a panel holds two overload relays, a no-voltage magnet, a lifting magnet, a time-limit control and the safety cutout button. Off, start and run positions are marked on the contact lift. These words register with a small glass-covered opening in the door to indicate the position of the starter when the door is closed. The contact board is hung from the actuating mechanism by a connecting rod and remains immersed with the contact fingers as long as the oil tank is in position.

The starter is being manufactured for 220-volt current between 7½ and 30 hp., for 440 and 550 volts up to 60 hp. in 60-cycle current, and for motors between 7½ and 30 hp. for 200, 440 and 550-volt, 25-cycle current.

Noble and Westbrook Automatic Ferrule-Numbering Machine

The Noble and Westbrook Manufacturing Co., Hartford, Conn., has perfected a combination of its numbering and marking equipment to make an automatic machine adapt-



Noble and Westbrook Automatic Ferrule Numbering Machine

able for marking and consecutive numbering of ferrules and similar small cylindrical parts.

As illustrated the machine consists of a base which supports an overhead frame to carry the number and letter assembly and into which a table is set for the work. The table is adjustable for height and carries an arbor for the piece to be marked. The fit does not allow looseness between piece and arbor.

The numbering and marking head is assembled to slide on rollers in the overhead frame and to be moved over the work at right angles to the axles of rotation of the work. The table is adjusted to the necessary height for the depth of impression desired and then as pieces are put on the mandrel one after another the head is drawn across them by the hand lever illustrated. When near the end of the stroke the head is indexed for the next piece by striking against the trip finger secured to the work table.

The machine illustrated is of the bench type and weighs approximately 60 lb. The numbering head can be removed from the machine if desired and used on a press for numbering flat work serially thus increasing its range of usefulness.

National Alloys "Injurnot" Copper Hammer and Vise Jaws

The National Alloys Co., 2120 East Woodbridge St., Detroit, Mich., is marketing a copper hammer and copper vise jaws made of pure sand-cast copper. The hammers are de-

National Alloys "Injurnot" Copper Hammer and Vise Jaws

signed with the point in mind of providing a high-class tool which will outlast the usual soft lead hammer, being harder than lead and yet being soft enough to keep from injuring the work they are used on. The jaws are of the same high grade.

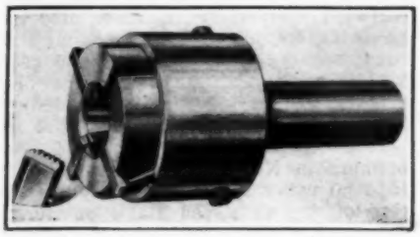
The hammers and the vise jaws as well have a high salvage value, being pure copper. They are made in all sizes.

SHOP EQUIPMENT NEWS

Geometric Rotary Self-Opening Diehead Style K

The Geometric Tool Co., New Haven, Conn., has placed on the market a rotary self-opening diehead, designated as Style K, that embodies some new features.

It is designed with particular reference to the various types of multi-spindle automatics and live-spindle machines, and is made small



Geometric Style K Diehead

in relation to its capacity in order that it may swing freely in the limited space usually available. It is simple in construction and is completely inclosed so that dirt and chips cannot get into the mechanism. Adjustments for diameter are made by means of a spanner-operated ring surrounding the shank behind the head.

The design is such that the chasers extend beyond the face of the head and it may therefore be used to cut threads close to a shoulder without alteration or adjustment. The chasers are rigidly supported on all sides without the necessity for a faceplate, and the elimination of this plate allows the chasers to be removed and replaced without difficulty and in a minimum of time by merely loosening one screw.

The diehead is opened, when it reaches the limit of the forward movement to which it is set, by the trip lever coming in contact with an adjustably located stop upon a fixed member of the machine in which it is used. The release allows the sleeve to recede along the body of the diehead under the action of a spring. The recession of the sleeve withdraws the chasers radially in their slots.

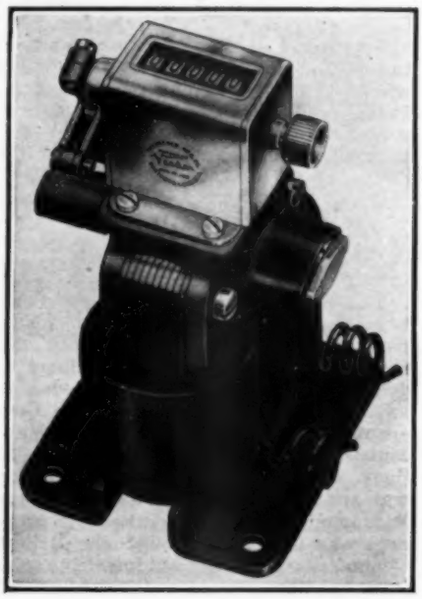
As the carrier of the machine reaches its rearward position the sleeve contacts with a fixed yoke that causes it to move forward with relation to the body until it is again locked in working position by the action of the latch.

The style K diehead is made in ¾-, 1-, 1¼- and 1½-in. sizes. Chasers for any commercial diameter, pitch or thread form, within this range, can be furnished.

Veeder Magnetic Counter Form U

A magnetic counter suitable for locating at some distance from a machine or point at which a count is required, has been developed by the Veeder Manufacturing Co., Hartford, Conn. It is being manufactured in two sizes, the Form U and the Large. The Form U is illustrated.

At the point where the count is to be taken some mechanical style of rotary, wiping or reciprocating "make and break" contact is necessary to close and open the counter circuit, and a source of direct current is required to operate an armature within



Veeder Magnetic Counter Form U

the counter. This armature turns through a partial revolution and actuates the counter mechanism when the circuit is closed against a spring which returns it to its original position when the contact is broken and the circuit thereby opened again. The counter can be supplied to specification for any reasonable voltage.

With this piece of equipment it is possible to make installation in a central office to get count on the performance of one, a group or an entire line of machines, or particular movements of any piece of equipment on which a record is desired.

Machinery Exports to France Increase

American manufacturers of machine tools increased their business considerably with French buyers during 1924, according to the Industrial Machinery Division of the Department of Commerce.

Exports of tools from the United States to France for the first nine months of last year, according to figures compiled from United States Customs returns, amounted to $1,291,744. This total represents an increase of 70 per cent over exports for the same period of 1923 when they reached valuations of $760,744, a difference of over $500,000. The growth in the exportation of this equipment to France is seen further when it is considered that shipment totals from the United States to France for the first nine exceeded those of the entire twelve months of 1922 by over $250,000.

Machine tools imported into France from all countries during the first eleven months of 1924 total 13,110 metric tons, according to figures of the French Government. This was an increase of nearly 1,500 tons over the totals of the corresponding period of the previous year, when they amounted to 11,682 metric tons. These figures represent a falling off from French machine tool imports for 1921 and 1922, when, for the eleven months in question, they reached 29,038 and 18,056 tons, respectively.

Export Markets for Machinery Belting

The Rubber Division is issuing a series of confidential special circulars, based on reports from foreign officers of the Department of Commerce and the State Department, giving information regarding export markets for machinery belting. Reports have thus far been issued on the following countries: Belgium, Brazil, British Honduras, Chile, Cuba, Egypt, Greece, Guatemala, Italy, Mexico, Peru, Poland and Salvador. The complete series will cover every important foreign market. The report on the Costa Rica market is published below to indicate the nature of the non-confidential information contained in these circulars; in addition the names and addresses of the belting importers and distributors are included in each circular, especially the names of firms which might be interested in handling American rubber belting. American firms desirous of receiving copies of the circulars should address requests to the Bureau of Foreign and Domestic Commerce at Washington, or to any District or Co-operative Office of the Bureau.

News of the Week

Variety of Milling Cutters Reduced at Simplification Conference

Thirty-five per cent of variety and sizes eliminated

Elimination of 35 per cent of the varieties and sizes of milling cutters from the existing catalog lists was adopted by a general conference of makers, users, government officials and technical society representatives, meeting March 25 in the Department of Commerce under the auspices of the Division of Simplified Practice.

As a further step toward the development of standards for this machine tool commodity, the conference named a standing joint committee to study technical and other problems, and to effect a liaison with a standardization section which the American Engineering Standards Committee is to create for study of this item.

The production on all but the simplified varieties will be stopped on July 1, while the conference fixed Jan. 1, 1926, as the date for the clearing away of the eliminated varieties from existing stocks and stores.

DISCUSSIONS

The program of elimination was discussed by Herbert S. Blake, secretary of the Milling Cutter Simplified Practice Committee, of New York City, by Charles M. Pond of the Pratt & Whitney Co., Hartford, Conn., and C. W. Machon of the Brown & Sharpe Manufacturing Co., of Providence, R. I., on behalf of the milling cutter manufacturers. These speakers advocated the need of a simplified practice program in order that the amount of "special" items might be lessened through concentration of sales effort on standard sizes.

USERS POINT OF VIEW

Francis S. Walters of the Westinghouse Electric Co., of East Pittsburgh, Pa., and E. K. Wennerlund of the General Motors Corporation, Detroit, Mich., discussing the program from the viewpoint of the users, were in favor of further technical studies. These two men were named as representatives of users on the joint committee of the industry to continue work in this direction.

E. W. McCullough of the United States Chamber of Commerce and Fred H. Colvin, editor of the *American Machinist*, discussed the program from the standpoint of the machine manufacturing industry as a whole. C. B. LePage of the American Engineering Standards Committee, New York, spoke on the work that is being undertaken in the direction of standardization. Other speakers included Ronald H. Allen of the Industrial Machinery Division of the Bureau of Foreign and Domestic Commerce of the Department of Commerce. E. W. Ely of the Division of Simplified Practice presided.

Will Simplify Bolt and Nut Packing

Following the action of other industries, manufacturers of bolts and nuts, working in conjunction with the Division of Simplified Practice of the Department of Commerce, are planning to reduce the excessive variety of packing methods in their product. The manufacturers have appointed a simplification group, headed by Ralph Plumb, president of the Buffalo Bolt Co. of North Tonawanda, N. Y. This committee is studying the methods employed at present among various manufacturers to note the number of items which, in their judgment, can be eliminated. A meeting of the committee to report on the progress attained will be held at North Tonawanda, April 3.

Buys Machinery at Scrap Prices

The Richmond Steel Co., New York, has acquired at scrap metal prices railway equipment and machinery valued in wartime at several millions of dollars. The property, which was to have been shipped by the British Government to Siberia, is now held at Vancouver, B. C., having been stopped there when the revolution in Russia was announced. Representatives of the Richmond company said that the property was acquired through the British Commission that is liquidating surplus war supplies.

Details covering the transaction were not made public, but it was admitted that the price paid was on a scrap basis. The Richmond company is negotiating for the sale of the property purchased.

Dinner in Honor of Edward D. Adams

Friends of Edward Dean Adams, including men in the fields of engineering, science, art, literature, transportation, finance, and industry will tender him a testimonial dinner at the Hotel Waldorf-Astoria, New York City, on April 9, which will be the occasion of his seventy-ninth birthday.

The speakers for the evening will be Dr. W. F. Durand, president of the American Society of Mechanical Engineers; Hon. James M. Beck, Solicitor-General of the United States; A. Monro Grier, president of the Niagara Power Co., and Mr. Adams.

Edward Dean Adams was born in Boston in 1846 and was graduated from Norwich University in 1864. He entered the employ of T. J. Lee and Hill, stock brokers in Boston, in 1866 as a bookkeeper, and four years later became a partner of Richardson, Hill & Co., bankers in Boston. In 1878 he became a partner of Lanier & Co., bankers in New York. From 1893 to 1914 he was the American representative of the Deutsche Bank of Berlin, Germany.

Mr. Adams has had a lifelong interest in engineering matters and has served on the Engineering Foundation Board since 1915. He is also a member of the Library Board of the United Engineering Societies.

Douglas Is New Secretary of National Acme Co.

A. W. Henn has been re-elected president of the National Acme Co., Cleveland, at the annual meeting recently held. O. F. Douglas has succeeded N. S. Rathburn as secretary and assistant treasurer. N. W. Foster has been re-elected vice-president and general manager and D. H. Parker has been elected assistant secretary. The personnel of the new board of directors is as follows: C. S. Eaton, J. O. Eaton, N. W. Foster, E. L. Geisner, A. W. Henn, O. L. Henn, F. H. Hobson, A. W. Hopkins and A. B. Thompson.

Farm Machinery for Russia

Further large shipments of agricultural machinery for Russia, amounting in value to $2,000,000, have been effected by the Amtorg Trading Corporation, agents in this country for the Gostorgs, or State Export and Import Bureaus of the several Soviet republics.

The Dutch steamer Aalsum sailed from New York March 25 with a cargo of 5,000 tons of plows, mowers, reapers, binders and other machinery and agricultural implements destined for the Russian Black Sea ports of Odessa and Norovossisk. Two more cargoes totaling 9,000 tons of machinery and including 450 tractors, destined for the same ports, are now in shipment on the steamer Alcor, which sailed from New York Feb. 20, and the Algenib which sailed March 1.

Industrial Conference Board Forecasts Steady Trend in Business

No obstruction to activity seen for the remainder of the year

A stable, sound and even flow of business activity for the remainder of the year is forecast in the opinions given by industrial leaders in a survey by the National Industrial Conference Board, 247 Park Ave., New York City, and weighed in the light of business conditions in the last five years as analyzed by the Board.

Business during the balance of the year, however, it is indicated, will probably be conducted under conditions of rising interest rates for loans, with a tendency toward lower prices in some industries, and generally stationary wages.

While there is no expectation of a boom, this is considered an advantage rather than otherwise, a steadier movement of business being felt to be more conducive to sane and dependable conditions.

Greater elasticity of production in adjusting itself to price changes, it is believed, has been brought about by industry's demonstrated ability to increase greatly the volume of production with a relatively smaller expansion in employment.

A good volume of traffic in an even flow is predicted by one prominent Eastern railroad executive, who expects business generally to move at an even pace during the balance of the year, without booms, and without any material recessions. Western railroads, he points out, of course depend more on the outcome of the crop situation.

In the electrical industry, good business for the rest of the year is expected now that the public utility companies have financed their major capital requirements, after some delay.

In the automobile industry, great conservatism had been shown as to 1925 prospects, due to the overoptimistic attitude of automobile makers in 1924, that necessitated a curtailing of production later that year. With stocks in dealers' hands now at a low ebb, and believing that the 1925 demand has been underestimated, good business is looked for during the rest of the year. An encouraging development in this industry is the increasing export trade.

Stabilization in Metal Trades

In the metal trades industries, a condition of stabilization greater than at any time since 1920 has been achieved. A tendency toward lower prices for metal products, seems apparent largely owing to keener competition. Wages (now very near the peak of 1920), are expected to remain mostly stationary. Production in this industry at present runs at about 80 per cent as compared with last year, or 65 per cent to 75 per cent as compared with the peak period in 1920.

Farm implement production is reported to have increased considerably during the past six months, and much more than in the previous four years. Business, however, is characterized as spotty. Prices and wages in this line are expected to remain stationary for the year.

While last February is described as "the greatest February in history" in the steel industry from the point of view of production, which is about 10 per cent above normal, stocks in consumers' hands are stated to be small.

John A. McGregor Dies After Long Illness

John A. McGregor, president of the Union Twist Drill Co. since its inception twenty years ago, died March 26

John A. McGregor

from a lingering illness at his residence in Athol, Mass.

Mr. McGregor was born in Brookville, Nova Scotia, Aug. 11, 1856, the son of John and Helen Grant McGregor. He started to serve an apprenticeship with the Brown & Sharpe Manufacturing Co., Providence, R. I., in 1872. With this concern he rose to position of assistant superintendent under Richmond Viall, leaving in 1893 to become vice-president of Edwin Harrington & Co., Philadelphia, in which position he remained two years. At the end of this time he resigned to accept the position of general superintendent with the Morse Twist Drill & Machine Co., New Bedford, where he remained ten years, leaving to become president of the newly formed Union Twist Drill Co. Athol, Mass. During the war he was also president of the Hopkins & Allen Arms Co., Norwich, Conn., manufacturing rifles for the Belgian government.

Mr. McGregor was a man of very strong character and had splendid executive ability. He took a very lively interest in the town in which he lived, especially in church work and in the Y. M. C. A. His great hobby was fine horses and he was formerly the owner of a string of trotting horses, one of which was "Iskander" who made remarkable records a few years ago.

He leaves a wife and three daughters, as well as two brothers, Hugh R. McGregor, superintendent of the Brown & Sharpe Co. in Providence, and James McGregor, a builder in the same city, also a sister in Nova Scotia.

Recent Corporation Reports

The following reports have recently been made by machinery and machine tool or allied corporations:

The Bullard Machine Tool Co. reports a net operating profit of $593,840 and a net income of $300,467, which is equal to $3.75 a share.

The net operating profits of the Doehler Die-Casting Co., Batavia, for 1924 is reported as $373,844, with net earnings placed at $299,343.

The Independent Pneumatic Tool Co., reports a net income for 1924 of $720,755, which is equal to $4 a share. The net income for 1923 was $1,468,786 which equaled $8.15 a share.

The Williams Tool Corporation shows an operating profit of $65,005 for the year ended Dec. 31, 1924. This compared with operating profit of $61,789 made in 1923.

The E. W. Bliss Co. reported a net income of $357,235 in 1924.

The National Acme Co. shows a deficit of $626,649 for the year 1924 as compared with a profit of $240,717 in 1923.

Fairbanks-Morse & Co. report an operating profit of $3,368,705 in 1924 as compared with $3,622,339 reported in 1923. The net profit for the year was $2,056,838.

The M. A. Hanna Co. reports a loss of $1,351,571 for the year ended Dec. 31.

The American Rolling Mills Co. reports a net income available for dividends of $2,845,055 as compared with $3,472,898 reported for 1923.

General Electric Pays Suggestion Awards

Awards totalling $39,531 were paid to 3,244 employees of the General Electric Co. during 1924 for suggestions which increased the efficiency of the company's operations. The suggestions ranged from safety devices for the protection of workers to improved methods of manufacturing electrical apparatus and the awards ranged from $1.00 to $1,000.

In 1923, $22,988 was distributed to 1,752 employees and the highest award was $500. Of all suggestions offered, 21.7 per cent were accepted. In 1924, the percentage of acceptances was 36, showing a considerable increase in the interest and awards in the suggestions system over the preceding year.

The Coming Conflict in Foreign Trade

Clearing up misinformation and dispelling fears—Gains by American exporters in ten years—Our raw material buying power

By Julius Klein

Director, the U. S. Bureau of Foreign and Domestic Commerce

THE gratifying increase in our export trade in 1924 over 1923, which showed a gain of some $430,000,000 or over 10 per cent, and the continued satisfactory gains in the opening months of 1925, have been offset to a certain extent by increasing doubts as to the dangers of competition from our European rivals in the leading overseas markets. There can be no question that the outstanding feature of the present international trade situation is this problem of the coming conflict among the great export nations. It is well at the outset to recognize frankly the intensity of this rivalry and the probable dangers that it involves to certain of our leading lines and trade positions.

There has, however, been so much misinformation circulated on the subject, bordering in some cases on near panic and hysteria, inspired in our midst in a few outstanding instances by our competitors themselves, that it is high time for a calm, dispassionate view of the actual facts as to where we stand competitively.

There are two preliminary observations which might be borne in mind, possibly by way of consolation for those who are inclined to be more panic-stricken, first of all, a casual summary of recent German and British trade papers and trade association reports reveals any number of indications of a precisely comparable fear on the part of our European rivals as to their prospects in the face of increasing American competitive effort. There is on every hand an evident searching for some plausible explanation of the persistence of American foreign trade success in spite of the six years in which Europe has had the opportunity to regain its overseas markets.

Before the War Trade

Secondly, it is well to remember that this is by no means the first instance of vigorous competition overseas: the period immediately before the war was marked by an equally intensive export effort and the outstanding conclusion to be derived from that conflict, especially during the years 1910-13, is unmistakably encouraging to the American foreign trade community. We were not only holding our own, but in such highly competitive areas as the "ABC" countries of South America we were rapidly overtaking our two rivals.

It is well to remind those who fear that the import capacity of these competitive markets is rigid and strictly limited that the total import purchases of Latin America, Asia, Oceania and Africa were well over $6,000,000,000 last year, which was more than double the annual average of 1910-13. By way of explanation of this expansion of the purchasing power of these markets which continues to move ahead at accelerated speed, it is only necessary to cite one such element as the trebling during the past decade of American industrial and commercial investments (exclusive of government bonds) throughout Latin America there we now have well over $3,000,000,000 engaged in reproductive enterprises as against a little over $1,000,000,000 in 1913.

Our Rapid Strides

If we examine the actual figures of the relative status of the three leading trade rivals in representative competitive markets, the situation is far from discouraging for our exporters. Taking the three most important South American countries, we note that in 1913 the United Kingdom easily led with a contribution of 29.7 per cent of their imports, Germany came second with 19.7 per cent and the United States as third with 13.5 per cent, although gaining rapidly on each of the others. By 1923, however, the situation was entirely changed, the United States and the United Kingdom being practically even with 24 per cent each, with perhaps a slight advantage in favor of the latter because of the heavy British interests in the Argentine; Germany had fallen far behind with about 13 per cent as her share. In other words, so far as the leading South American markets were concerned, the United States had nearly doubled her relative strength.

In the three leading Far Eastern markets a similar transformation had taken place. In Japan our share of the imports rose from 16 per cent in 1913 to 26 per cent in 1924; whereas those from Great Britain fell from 16 per cent to 12 per cent, and Germany's declined from 9 per cent to 6 per cent. In China the American gain was even more impressive during the same period, rising from 6 per cent to 16 per cent, whereas Britain's share fell from 16 per cent to 13 per cent and Germany's from 5 per cent to 3 per cent. Even in India, a supposedly impregnable stronghold of British trade, though still dominated by her merchants, the American portion of imports though small is growing, having risen from about 2½ per cent to nearly 6 per cent. These specific examples might serve to illustrate the fact that American merchants and manufacturers have by no means been driven from the field. One of the most significant and promising phases of our relationship with these economically "new" countries is the amazing growth of our purchases of raw material from them, which increased from an annual average of $734,000,000 during the five pre-war years to nearly treble that figure, or $2,112,000,000 in 1924. The establishment of such formidable credits in this country by raw material producers in Asia, Latin America, Africa, and Oceania is bound to have a profound effect upon the prospects of our sales to them. We are now buying about seven times as much crude rubber as we did before the war and some two or three times as much silk, vegetable oil, cacao, sugar, and many other overseas raw materials.

The steadily advancing prosperity and growth of productive capacity within the United States is one of the best indices of our competitive powers.

We hear much of mass production and of its vast powers in determining competitive ability, but we do not always realize the tremendous advantage that the United State actually has in this particular connection. Our manufactures were valued at about $25,000,000,000 in 1914; their value in the recent census of 1923 was indicated at approximately $60,000,000,000—a most impressive increase even after allowance is made for liberal price changes during the decade. In pig iron, for example, the gross tonnage produced by the United States in 1913 was 30,600,000 which was practically the same as the combined output of the United Kingdom and Germany, namely 29,300,000 tons. By 1924 this predominance had been almost doubled, that is to say, the American output was 31,000,000 tons, whereas the combined British and German output was only 15,600,000 tons. A similar situation prevailed in ingot steel in which the American production in 1913 was some 31,300,000 whereas the British and German combined total was slightly in excess of 26,000,000 tons. By 1924, however, the American production had risen to 37,800,000 tons whereas the production of our two European rivals was slightly under 17,000,000 tons.

Quality or Cut Prices

Fundamentally, the issue between the American exporter and his rivals would seem to be one strictly of whether quality or cut prices should prevail. As between the two there is no question as to the ultimate decision of the American merchant or manufacturer. A strict adherence to those high standards which have long given American wares their standing in oversea markets would seem to be the firmest, and in fact, the only foundation for a lasting edifice in our foreign trade. It is quite probable that this may mean a loss in certain lines and trade centers, but there is some comfort in noting that European price cutting seems to be decidedly on the wane for several strong reasons.

Excerpts from a speech made before the American Manufacturers' Export Association at the Hotel Astor, New York City, March 25.

Personals

J. WALLACE CARREL of the Lodge & Shipley Machine Tool Co., Cincinnati, Ohio, will sail for Europe April 4 on a business trip for several weeks. He will be accompanied by his wife.

HERBERT THEURICH has been appointed by the Marshall & Huschart Machinery Co., Chicago, to be its representative in Wisconsin with headquarters in Milwaukee. Mr. Klaiber will continue to represent the company in Milwaukee as he has in the past.

L. E. HONEYWELL, formerly advertising manager of the National Acme Co., has been made advertising manager and sales promotion manager of the Sterling Manufacturing Co., Cleveland.

EX.-GOV. JAMES HARTNESS, of Vermont, president of the Jones & Lamson Machine Co., Springfield, Vt., is seriously ill in Boston.

CARROLL H. MOUNT, formerly with the Stearns Conveyor Co., Cleveland, has accepted a position as sales engineer with the Jeffrey Manufacturing Co., Cleveland.

STILES C. SMITH is the manager of the recently opened Cleveland office of the Smith Power Transmission Co. He was formerly with the Morse Chain Co., Ithaca.

CLARENCE CARSON has been made chief engineer of Dodge Brothers, Inc., Detroit. Until recently he was assistant chief engineer of the automotive plant.

A. J. GILLESPIE has been appointed sales representative for the Cleveland office, by the Wollmar Engineering Corporation, New York, for NKA ball and disk bearings. His headquarters will be at 8500 Lake Ave., Cleveland, Ohio.

EDWARD C. FARRELL, of 28 Victoria St., London, S. W., has been appointed sales engineer for Great Britain by the J. N. Lapointe Co., New London, Conn.

H. H. HAARBAUER, for some years superintendent of the nail mill of the British Empire Steel Corporation, Sydney, N. S., has resigned to take a position with the Northwest Barbed Wire Co., Stirling, Ill.

BURTON ST. JOHN, vice-president and general manager of the Canadian Equipment Co., Ltd., Montreal, has purchased all of the outstanding capital stock of that company and has assumed control as president.

LEON J. BARTLETT of Worcester, Mass., has purchased the business and plant of the Curtis Machine Co., Worcester, and will continue the manufacture of the Curtis centrifugal oil extractor.

CHARLES S. DURKEE has been appointed Western district sales manager for J. H. Williams & Co., Buffalo. His headquarters will be at 117 N. Jefferson St., Chicago, and his territory will be the West and Southwest.

Business Items

The Foote-Burt Co., Cleveland, Ohio, has purchased the drilling machine business of the Sipp Machine Co., Paterson, N. J. The Sipp company has been manufacturing sensitive drilling machines. The Foote-Burt Co. will continue the line.

The Kearney & Trecker Corporation, Milwaukee, has expanded its office facilities so as to provide larger quarters for its production, service, sales, and advertising departments.

The Rich Tool Co. has consolidated its offices and the executive, sales, engineering, treasury and accounting departments at the plant offices, 1501 Ferry Ave., East, Detroit. The offices were formerly located in the Railway Exchange Building, Chicago.

The Peerless Machine Co., formerly at 40 Water St., So. Norwalk, Conn., has moved into larger quarters in East Norwalk.

The John H. McGowan Co., Cincinnati, Ohio, has bought the Twinvolute Pump & Manufacturing Co., Newark, N. J.

The Industrial Controller Co., Milwaukee, electric controlling devices, has purchased the plant of the Riverside Printing Co. and will move into it immediately.

The General Piston Ring Co., Indianapolis, Ind., has moved its plant to Tipton, Ind.

The Hoyt Metal Co., babbitts, with a capital of $1,000,000, has been incorporated in Canada with the object of taking over the business in the Dominion of the Hoyt Metal Co. of St. Louis, Mo. The headquarters of the company will be at Toronto.

The machinery section of the engineering building of the University of Saskatchewan was destroyed by fire March 13. The loss is estimated at $500,000.

The National Iron Corporation, Ltd., Toronto, Canada, is installing new equipment in its plant for manufacturing a special brand of cast-iron pipe. These extensions will more than double the capacity of the plant.

The Meeker Arms Co., New Haven, Conn., has filed a preliminary certificate at the office of the Connecticut state secretary to manufacture arms, machinery and tools with a capital of $50,000.

Fire destroyed nearly the entire plant of the Muncie Malleable Foundry Co., Muncie, Ind., causing a loss that has been estimated at $50,000.

The Dismuke Iron Works, Inc., 416 Thirtieth St., Columbus, Ga., has recently been organized to conduct a general foundry and machine shop business.

W. E. Moore & Co., engineers, have moved to the foot of 32nd St. and Putney Way, Pittsburgh.

The Master Electric Co., Dayton, Ohio, has purchased the property formerly owned by the Davis Sewing Machine Co. located at Linden Ave. and the Pennsylvania R.R. tracks.

The Keeney Manufacturing Co., formerly of New Britain, Conn., is now located in its new plant at Newington, Conn.

The Wausau Iron Works, Wausau, Wis., has purchased all of the equipment of the Wausau Foundry & Machine Co., which recently discontinued business after thirty-five years. The foundry company's buildings are to be razed.

The Shand Engineering & Sales Co., of Columbia, S. C., has been appointed South Carolina distributor by the Stockland Road Machinery Co., of Minneapolis.

The Morton Machine Works has been chartered with $100,000 authorized capital at Columbus, Ga., and will engage in the general foundry and machine shop business in that city. Incorporators named include F. M. Morton, S. W. Jackson and W. P. Sayers, all of Columbus.

Obituaries

EYZY B. VANATTA, president of the E. B. VanAtta Co., Olean, N. Y., died at the Johns-Hopkins Hospital, Baltimore, Md. He was formerly vice-president of the Hydraulic Steel Co., Mt. Gilead, Ohio.

NEWMAN ERB, president of the Ann Arbor R.R., former vice-president of the Pere Marquette R.R. and identified with nearly a dozen other lines, died at Roosevelt Hospital, New York City, in his 75th year, following an operation.

WILLIAM MANLEY, of the firm of Leary & Manley, owners of the Queen City Foundry, Spring Grove Ave. and Alabama St., Cincinnati, died March 19, at the age of 67 years. He was born in Hamilton, Ontario, and came to Cincinnati as a youth. He was in the foundry business 45 years.

Stevens Honored by Engineering Societies

John Frank Stevens, civil engineer, was awarded the John Fritz Gold Medal at the meeting of the four leading American engineering societies at the Engineering Societies' Building, 29 West Thirty-ninth Street, recently. The award is the highest recognition of specific achievement in the engineering profession. Among Mr. Stevens's great works was the planning and organizing for the construction of the Panama Canal, the building of the Great Northern Railroad and the administration of the Chinese Eastern and Siberian Railways during the war.

Ralph Budd, president of the Great Northern, told of Mr. Stevens's work with that road and on the canal. He said that when James J. Hill started to build his railroad "the success of his venture rested upon the sound judgment with which the lines were laid out and built."

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry based on current developments

By Theodore H. Price
Editor, *Commerce and Finance, New York*

(Copyrighted, Theodore H. Price Publishing Corporation, 16 Exchange Place, New York)

IF PUCK had visited Wall Street last week it is altogether probable that he would have again remarked "What fools these mortals be," as he heard those who were fanatically bullish two months ago predicting a continued decline in the stock market.

It is probable that the extremists are wrong as usual, but as also usual in moments of psychological depression most of the news is discouraging and only the courageous and philosophical optimists are able to disregard it. Even the usually cheerful Judge Gary seems to have been affected by the prevailing melancholia for in presenting the annual report of the Steel Corporation he was apologetic for net earnings which showed a reduction of $24,000,000 from last year's total of $109,000,000 and explained that they were not a proper return on the value of the investment employed.

The showing referred to and the pessimism that it seems to have engendered helped to intensify the weakness on the Stock Exchange, where people entirely forgot that the report had to do with the business handled in 1924 and that 1925 is another year.

The same thing is true of the St. Paul receivership as well as of a receivership for the Boston & Maine that threatens. They are both the result of water that has gone over the dam and the financial surgery to which these companies are now to be subjected ought to improve their condition. In this connection it may be reassuring to recall that the common stocks of the Atchison, Topeka & Santa Fe, the Northern Pacific and the Norfolk & Western all sold at less than $5 a share in 1894, that Union Pacific sold at $7 a share in the same year and that in the long run the bargain hunter has generally fared better than the bear raider in this great country of ours.

To the commodity markets the same generalization is applicable. It may be true, as some allege, that a decline has set in that will carry us back to pre-war values. Following the Napoleonic wars and our own Civil War the re-establishment of the gold standard caused such declines. In the case of the Napoleonic wars the depreciation commenced in 1822, seven years after Waterloo, and in 1872, seven years after the surrender of Appomattox, the decline which followed the Civil War began.

It may be that history will repeat itself, but if it does the cost of living will be reduced and people will be willing and able to go to work again at wages that will justify the enterprise that is now suspended because capitalists fear to put their money into new construction while wages and building material are both held at high figures.

What's Doing in Industry

Business during the month of March in the machinery and machine tool industry proved to be as good or perhaps a trifle better than that done during February, despite a general let-down felt in all parts of the country during the last week of the month. The Middle West probably was the busiest with reports from Cincinnati, Detroit, Milwaukee and Chicago showing steady improvement in both orders and inquiries. Buffalo, Cleveland, New York, Philadelphia and the South did not show up as well and in some cases business was below that of February, but the average for the country was a slight increase.

A notable feature of the last few days of the month was the increase in the volume of inquiries received which presages a good opening in April and the usual barometers of the industry point to good, steady business until June 1 at least.

Automobile manufacturers bought more during March than during February, while the railroads bought considerably less. General industrials came into the market in larger numbers than since last fall, while the big electric companies bought sparingly and for necessities only.

There has been a remarkable growth in the demand for small presses and makers of presses are busy, according to reports.

Exporting is getting more and more attention from manufacturers, especially manufacturers in the Cincinnati and the Rockford, Ill., districts. Many of these leaders report that exporting is gaining and that they are going after this business with more effort than ever before. New England machine tool builders reported similarly in February.

For it is becoming more and more evident that the urgent need for housing is supplied and that a resumption of constructive activity now depends upon what it will cost.

The decline if it comes will be directly due to the operation of the law of supply and demand, and the same law is responsible for the smaller net earnings that some railways are commencing to report. The Union Pacific is an example. Its net for February was but $3,818,000 as compared with $5,557,000 in the same month last year, and several other big systems are beginning to show a similar tendency.

A reduction of 13,000,000 tons in the bituminous coal production for February is another instance of the effect of high prices upon consumption. Coal is in consequence lower. For the same reason the coffee market is stagnant and silk, wool and woolen goods are tending downward.

Rubber, the price of which is artificially controlled, is about the only article that has advanced. Everything else is either unchanged or lower, and the American public seems to have made up their minds to buy as sparingly as possible until they can get more goods for their money.

Steel, copper and most of the other metals have been slow and are somewhat lower. So are hides and leather. Prices for grain, especially corn, have shown a tendency to fade away. The cotton market has a dubious undertone despite the vigor of the bullish propaganda, and sugar, though low and cheap, has also been just a little soft.

Distributive trade in the necessaries is called normal and the turnover is impressive, for 115,000,000 people consume a lot of stuff even when they are economizing. But there are no signs of the business revival that last winter's stock market was supposed to be discounting. The high prices appear to have averted it and many are coming to the conclusion that a general decline is necessary if the goods that America can manufacture are to be sold.

Such a decline may bring about a psychological depression for a time, but the ultimate effect will be salutary. It will decrease the cost of production and of living and will provide employment for the many who are now unemployed.

Therefore it should cause no apprehension, for stocks are low, the Federal Reserve statement shows that credit is abundant, the condition of the country is sound and under-consumption is the only thing that stands in the way of genuine prosperity. Since it seems impossible to remove it by urging the public to buy at present quotations it may be well to try the age-old cure of increasing sales by reducing prices.

It has rarely failed to work.

The Industrial Review

Progress of the machinery and machine-tool business in various parts of the country

THE following reports gathered from the various machinery and machine tools centers of the country, indicate the trend of business in these industries and what may be expected from the future:

Chicago

Dealers in machine tools and special machinery generally express themselves as not dissatisfied with present market conditions. It is frankly admitted that it might be much better, but that it is slowly advancing on an upgrade and affords grounds for satisfaction.

Inquiries are fairly numerous, and sales continue to improve in number, the demand being mostly for small lots. Prospective railroad budgets are looked forward to as affording opportunities for new business that will take on worth while proportions, but the automotive and radio producing industries are providing most of the present demand. The Atchison, Topeko & Santa Fe R.R. is inquiring for the following: Two 2-in. double-head bolt cutters; one pneumatic flue swedging machine; one pipe threading machine; one pneumatic jib crane; one car wheel journal turning and axle lathe; one 36x36-in.x14-ft. planer, and one 5-ft. radial drill.

Producers of coal mining machinery are noting with satisfaction that a number of coal mines in Indiana have installed cutting and loading machines and that others are proposing to follow suit. The mines referred to are situated along the lines of the E.I. and T.H. R.R., and show almost 25 per cent increase in production over the month preceding.

Philadelphia

Some of the Eastern railroads are in the market for steel purchases and railroad car repair shops have shown increased activity this month compared to February. These reports, from the monthly statement of the Federal Reserve Bank for the Third District, were received in the industrial centers of Philadelphia this week with considerable interest.

Bankers and other business men see in the present conditions a fundamentally sound situation, although the machinery manufacturers and the machine tool producers report there is nothing in the present situation to indicate an early return to quantity buying.

Virtually none of the manufacturers in Philadelphia is producing anything except for immediate needs, and how soon there will be an improvement in this situation is impossible to determine at this time.

Factory employment in eastern Pennsylvania, Delaware and New Jersey increased in February over the corresponding month of 1924.

Nearly all of the industries have shared in this advance, but the greatest improvement occurred at car repair shops, foundries and blast furnaces, according to the compilations of the Federal Reserve Bank. Automobile manufacturers are taking a fair-sized order of steel.

Iron and steel production continued to increase in February. Unfilled orders of the U. S. Steel Corporation were larger last month. Lately the demand has lessened, and prices have weakened somewhat. Uncertainty prevails in other lines.

Cleveland

Uniform improvement in the demand for machine tools in the Cleveland district has not developed through March, but there has been a sufficient increase in outlet for certain kinds of equipment in the last fortnight to warrant expectations being realized for a continued gradual replacement program by the manufacturing interests.

The shear and punch division has shown some stimulus in the last ten days, but this has been confined largely to inquiries rather than to actual orders. Manufacturers in this field have now decided they must depend more upon general industrial activity rather than the structural steel manufacturers for outlet for new equipment, and are concentrating their attack for new business in that direction.

Automatic machine business shows steady improvement, but here also the unusual is lacking. Rather, producers here are content to see a gradual gain in orders, instead of a sudden spurt, since past experience has proved that the latter has generally been followed by a period of inactivity. Through March there have been steady gains each week, and a still bigger improvement in inquiries, which is taken to indicate more rapid outlet with the opening up of spring.

In the planer field conditions are spotty. Since the beginning of the year this branch of the trade has made the largest gains. Some letup in demand in the last week has altered this, but the situation still is upheld by plenty of orders in prospect.

Detroit

March sales in the machinery and machine tool fields in Detroit and southeastern Michigan have been the largest in some months, and every indication is that April sales will exceed those of March.

Reports from leaders in the machine tool industry are to the effect that the automotive plants are buying on a larger scale than for some time. The same tendency is noted in other lines.

Dodge Brothers, Inc., is in the market for equipment for a light hammer shop to be constructed soon.

The Hudson Motor Car Co., is in the market for conveyors and equipment for assembling automobiles to be placed in the new assembly plant now being rushed to completion.

The Whitehead & Kales Co. is in the market for a 60-ton locomotive crane with double hoisting drums.

The Wynn Auto Sales Co., of Sault Ste. Marie, Mich., is in the market for a repair shop lathe, drill press and air compressor.

The R. J. Tower Iron Works, of Greenville, Mich., has purchased the furnace patterns of the Taplin Furnace Co. at the receiver's auction, and expects to purchase some more equipment soon.

The Pere Marquette R.R. in its expenditure of $80,000 in enlarging the engine house of the Wyoming yards at Grand Rapids, Mich., is laying in a larger supply of small tools.

The Fenton Tool & Die Co., of Fenton, Mich., is in the market for die making equipment. The company will build a $25,000 factory addition.

The Knapper Sheet Metal and Manufacturing Works, of Kalamazoo, needs a power rotary circle, 24-in. throat shear to cut metal up to eight gage.

On April 1 five of the leading producers of motor cars will be numbered in the thousand-a-day class, and together will be making more than 14,000 automobiles a day. With every point in the industry increasing its output during the month it seems very probable that production for April, 1925, will establish a new high mark. Ford, Chevrolet, Willys-Overland, Dodge and Hudson-Essex promise to rank in the thousand-a-day class or better.

Cincinnati

Business in the machine tool industry seems to have improved to at least a small extent this week. The majority of concerns report a slightly increased volume of sales and practically all report the receipt of a much larger number of inquiries than have been coming in.

An executive of one concern, who is now in Germany, reports that some orders for American machinery are being placed there and he predicts that in ten or twelve months there will be at least a fair business from that market. Inquiries from France, it is stated, are also coming in.

Orders from the automotive industries, it is stated, have been considerably better than they were, and the increased number of inquiries coming in are taken to indicate that there will be a better demand from this source. An encouraging report received from Detroit says that "with every plant in the automotive industry increasing its output, it seems that April, 1925, will establish a record greater than that of

May, 1923, which was the highest, with a production of 385,640 cars and 24,880 trucks."

Some fair-sized orders have been received from railroads this week, including purchases of large tools, and an increased number of inquiries have been coming in from this source. While the demand from the railroads is not yet back to normal, it is showing a marked tendency to return.

New England

The first quarter of 1925 draws to a close with a feeling of satisfaction on the part of machinery builders—especially the builders of the heavier types of machinery—over the volume of business obtained in the three months. Not only do the figures already in hand indicate that operations have been carried on at a profit, but the gradual upturn of the curve is consistently pointing higher and may attain even a better level within a month. The opinion prevails that this height will be maintained throughout the year, and in some instances belief was expressed that it will carry well into 1926.

Final figures for the quarter will not be obtainable for a few days, but those available serve to emphasize the better condition prevailing. Two manufacturers who operated the first quarter of 1924 on a paying basis are authority for the statement that the total business for the quarter this year is on a basis of 7 per cent higher in one instance and 10 per cent in the other.

The volume of orders is a strong indication of the improvement of the export business. Orders placed in the last week were not as large as in the six weeks immediately preceding. This loss, however, was more than made up by the better domestic business.

Buying for the automotive industry fell off during the past week.

Milwaukee

While a number of manufacturers in the metalworking equipment industry have to report a moderate increase in bookings during March, compared with February, others say they had had trouble keeping even, and a few report a decrease. On the whole, a little ground was gained. Dealers found March better than either January or February, and believe that April will witness the demand for machine tools and other equipment getting into its stride.

General business has proceeded in a jerky manner for about sixty days, and it is to the credit of the machinery industry that it is able to stand out as the sole group which has made consistent gains in the number of employees since the beginning of this year. The group covers foundries and machine shops, and the figures are taken from reports regularly made to the employment office.

Manufacturers of equipment for construction work, notably concrete highways, are exceptionally busy striving to keep production even with shipping specifications. This is not an unusual situation at the end of March, but the fact that the state of activity is greater than a year ago is considered of note.

Buying of tools by automobile factories has been less for three months than a year ago, so far as standard production tools are concerned, but concerns specializing in multi-purpose machines are getting about all the business they can handle.

The used tool business is fair. The local supply recently has been sharply augmented by the auction sale of the equipment of the Milwaukee gas engine plant of the Avery Co., Peoria. Purchases were made at exceedingly low prices and resale is therefore possible at correspondingly heavy reductions, which make the average of recent months appear high.

Indianapolis

Machinery and machine tool business remains somewhat spotted in this district, due largely to inactivity in some of the major industries. Heading the list of inactivity is the automobile industry. Its purchases of machinery and particularly tools have been disappointing during the last two weeks. It was generally believed that with the advent of spring these industries would see a revival of business. The accessory factories here are busy, however, and the demand from them is on the upgrade.

Sales of special machinery for the furniture-making industry have fallen off also. These factories have suffered lately from an epidemic of cancellations and instructions to delay shipments with the result that several expansion projects have been held up.

There are some bright spots, however. Demand for machinery and tools in the farm implement factories of the state has picked up. In virtually every factory additional men are being employed and production is expanding. Another bright spot comes from the fabricating plants where the approach of the building season has caused renewed activity. Both machinery and tools are being sold more readily to these plants.

Manufacturers here of machinery used in lumber mills report better sales and the same is true of sales to flour mills. The railroads appear to be confining their purchases to actual requirements and inquiries from this source are small in volume.

Dealers in used machinery say there appears to be plenty of this sort of machinery available and during the last two weeks the demand has picked up somewhat.

Southern District

Though machine tool and mill supply inquiries have been reported fairly active during the past two weeks by the Southern trade, the volume of business has shown substantially no increase over the early part of the month. Sales have, however, continued to hold their own, and due to the unusual amount of new industrial construction that is in progress throughout this district the March volume, when the figures are compiled, will show some increase over February, according to the larger distributors.

Industrial construction is the most encouraging feature of the situation in the South. Figures compiled by a well known industrial engineering and financing concern in Atlanta covering the sixteen Southern states show that a number of new records have been established in the South so far this year in this respect, with the greatest activity reported in the lumber and woodworking industries, garage and service station field, the railroads, the textile industries, the foundries and machine shops, and in the construction of good roads.

The Southern railroads still are reported among the most active buyers in the heavier equipment field, with inquiries coming in for equipment that will be needed for projects planned later in the year, and a fair amount of buying reported for projects that are now underway, the total of which amounts to several million dollars. The Chesapeake & Ohio has just announced a $1,650,000 terminal, shop and track building program at Russell, Ky., work to begin in the near future.

In the service station and smaller machine shop fields the primary demand continues to be for used tools.

New York

Business during the month of March in the New York machinery and machine tool markets about equaled that done during February according to the dealers, with inquiries again showing increases which approximates the condition existing in January and February. In January the inquiries presaged better business for February and this was realized. Dealers point out that following this precedent business in April should be improved.

Railroad buying has been disappointing during the entire month with single tools bought by small roads the rule. Only two sizable lists—one from the Lackawanna and the other from the C & O—made their appearance during the month. Southern roads in Florida, the Carolinas and Virginia bought in the New York market during the past week.

General industrials were the best buyers during the week with orders received from nearly all parts of the country. Pennsylvania traction companies and Southern textile mills placed small orders.

The used tool market was improved during the week and business in this department averages good for the first quarter of the year.

Will Sell the Garvin Machine Tool Plant

The entire stock and fixtures of the Garvin Machine Tool Co., Spring and Varick Sts., New York City, will be offered at auction on April 28, 29 and 30 by Samuel T. Freeman & Co.

There are listed about 900 machine tools besides many repair parts. Of this number 400 are Garvin tools that are all new, and used tools consisting of machine, engine and turret lathes, automatic screw machines, grinders, drill presses, boring machines, milling machines, Landis grinders, planers, and small tools and attachments. The auctioneers are mailing catalogs on request. Their addresses are 80 Federal St., Boston, and 1808 Chestnut St., Philadelphia.

Calendar of Local Meetings

American Society of Mechanical Engineers

Utica, N. Y. April 2. Local meeting. "The World Power Conference," Calvin W. Rice. B. E. White, secretary, 222 Genesee St., Utica, N. Y.

Allentown, Pa. April 3. Local Meeting. "Storage and Handling of Coal." H. E. Broughton, secretary, the Trojan Powder Co., Allentown, Pa.

Columbus, Ohio. April 3. Local meeting. "The Engineering Profession—Its Antiquity and Its Obligations," Dr. William F. Durand. Arthur Richards, secretary, Chillicothe, Ohio.

Cleveland. April 6. Local Meeting. Dr. W. F. Durand, "The Engineering Profession — Its Antiquities and Obligations." C. D. Zimmerman, secretary, the Cleveland Electric Illuminating Co. E. 70th St. Station, Cleveland.

Hartford, Conn. April 7. Joint meeting with the American Society for Steel Treating. H. W. Schwartz, "Present State of Art of Malleable Iron." C. W. Mayott, secretary, the Hartford Electric Light Co., 266 Pearl St., Hartford, Conn.

New Haven, Conn. April 7. Local meeting at Mason Laboratory. "Development of Belt Conveyors," C. K. Baldwin. Prof. S. W. Dudley, secretary, 400 Temple St., New Haven, Conn.

Toronto, Canada. April 8. Local meeting at the University of Toronto. "Present Tendencies of Steam Generation," J. O. Twinborro. H. C. Crane, secretary, 50 Simpson Ave., Toronto, Can.

Baltimore, Md. April 8. Local meeting. "Development of the Aeroplane Engine." Commander Wilson. Prof. J. C. Smallwood, secretary, Johns Hopkins University, Baltimore, Md.

Chicago. April 8. Local meeting at the Western Society of Engineers. "Material Handling." F. B. Orr, secretary, the Illinois Maintenance Co., 1136 Edison Building, Chicago.

New York City. April 9. Local meeting of petroleum division. Subject and speaker to be announced later. Fred J. Bechert, secretary, 350 Madison Ave., New York City.

Buffalo. April 14. Local meeting. M. S. Schneider, "Material Handling." C. G. Kaelin, secretary, 635 Genesee St., Buffalo, N. Y.

Milwaukee, Wis. April 15. Local meeting at the Milwaukee Athletic Club. "Cooperation between State University and Industry." Robert Cramer, secretary, 1105 Vliet St., Milwaukee, Wis.

San Francisco, Calif. April 16. Local meeting. "Engineering and Finance," Guy Emerson. F. Birdsall, secretary, the Bethlehem Shipbuilding Corporation, Ltd., San Francisco, Calif.

Bellingham, Wash. April 17. Local meeting. "Portland Cement Grinding," Mr. Krobbe. R. L. Rockwell, secretary, 955 Empire Building, Seattle, Wash.

Salt Lake City, Utah. April 18. Local meeting. "Training of Industrial Foremen." W. H. Trask, Jr., secretary, University Club, Salt Lake City, Utah.

State College, Pa. April 18. Local meeting "Power Plants for Air Craft," Lieut. Commander E. E. Wilson; "Management," Wallace Clark. Prof. L. J. Bradford, secretary. Pennsylvania State College, State College, Pa.

Portland, Ore. June 22 to 25. Pacific Coast Regional Meeting.

American Society for Steel Treating

Schenectady, N. Y. Spring Section Meeting. May 28, 29 and 30. Hotel Van Curler. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

National Association of Cost Accountants

Chicago Chapter. April 9. Annual Banquet. "Figuring Costs of Distribution."

Worcester Chapter. April 9. "Costs for Managerial Uses."

Philadelphia Chapter. April 10. W. H. Jackson, "Cost as an Aid to Management."

Milwaukee Chapter. April 14. W. K. Adams, "What Information Does the Bank Want."

Cleveland Chapter. April 15. "Problems of Distribution" and "Figuring the Costs of Distribution."

Rochester Chapter. April 15. M. J. Hayes, "In What Manner Do We Give Information to Foremen?" "How We Use Cost Information that is Given Us."

Syracuse Chapter. April 15. James E. Halligan, "Budgets in Franklin Management."

Buffalo Chapter. Aril 16. "What Information Does the Banker Want," and "Preparing Cost Data for Managerial Control."

American Welding Society

Chicago. April 3. C. E. Zeisel, "Applications of Welding and Cutting."

Buffalo. April 15. S. L. Walworth, "Cutting and Welding by Carbon Arc."

Boston. April 17. Prof. V. O. Homerburg and C. E. Littlefield.

Philadelphia. April 20. S. W. Miller, "Welding Pressure Vessels."

Cleveland, April 21. Interesting welding jobs. Mr. Boom of Boom Boiler & Welding Co.

Pamphlets Received

Take-Off Characteristics of the DH-4. Published by the Chief of the Air Service, Washington, D. C. The booklet is an air service information circular. There are several tables and charts besides an account of a detailed study of the take-off of this type airplane.

Elimination of Waste in the Manufacture of Steel Barrels and Drums. The United States Department of Commerce, Washington, D. C. This simplified practice details the work that has been done by the department in this classification.

The Effect of Changes in Compression Ratio upon Engine Performance. The National Advisory Committee for Aeronautics Washington, D. C. Report No. 205 has been prepared by Stanwood W. Sparrow of the Bureau of Standards. Many tables have been used in the report and the text covers a number of phases of the subject.

Trade Catalogs

Molds and Ladles. Charles H. Field, Providence, R. I. Molds and ladles for casting soft metal hammers and vice jaws are described in this compact folder. Method of use and the many advantages of the molds are told as well as other data of interest. The prices are also given for each style.

Milling Machines. The Kearney & Trecker Corporation, Milwaukee, Wis. Emphasis is laid on the motor-in-the-base milling machines made by this concern and comprehensive descriptions of the new products are given. Four illustrations show the machine from different angles each accenting an advantage. Floor plans and specifications with a sectional drawing are also contained in the folder.

Belting. The Chicago Belting Co., 113-125 N. Green St., Chicago, Ill. Very unique and very emphatic is this mailing folder that has been issued recently. By a series of folds the story is disclosed sending home the point that there is a difference in the quality of leather belting and that this difference should be learned by the discriminating buyer. The folder has the advantage of telling the story in an unmistakable manner and by entertaining methods.

Wire Cloth. The Newark Wire Cloth Co., 351-365 Verona Ave., Newark, N. J. Catalog 25 has been mailed out to the industry. Complete descriptions of the various kinds of wire cloth and the prices are contained as well as illustrations showing the various meshes.

Cold Drawn Steels. The Anchor Drawn Steel Co., Latrobe, Pa. This company's list of machine tool steels are contained in this booklet with dimensions and prices.

Machinery and Tools. The Brown & Sharpe Manufacturing Co., Providence, R. I. General catalog No. 138 containing over 600 pages has been issued. The complete line of this company is listed in the publication and there are half-tone engraving used to illustrate each piece of equipment. Detailed descriptions of each product as well as specifications and dimensions are given. The catalog is a convenient pocket size containing much useful information. Copies may be obtained from any of the company's domestic or foreign agents or will be mailed direct from the factory upon request.

Export Opportunities

The Bureau of Foreign and Domestic Commerce, Department of Commerce Washington, D. C., has inquiries for the agencies of machinery and machine tools. Any information desired regarding these opportunities can be secured from the above address by referring to the number following each item.

Marine motors, Amsterdam, Netherlands. Purchase. Reference No. 14,193.

Fractional hp. motors, measuring instruments, fans and wire devices. Sydney, Australia, Agency. Reference No. 14,175.

Bolts, nuts, nails, screws and rivets. Alexandria, Egypt. Agency. Reference No. 14,173.

High-speed twist drills, and engineers' cast steel files. Bombay, India. Purchase and agency. Reference No. 14,171.

Cast iron taps with round and eliptical openings. Hamburg, Germany. Purchase. Reference No. 14,172.

Machinists' and metal workers' tools. Bordeaux, France. Agency. Reference No. 14,195.

Machinery, Madrid, Spain. Agency. Reference No. 14,138.

Woodworking machine and pumps of various kinds. Amsterdam, Netherlands. Purchase. Reference No. 14,193.

Forthcoming Meetings

American Welding Society. Annual Meeting. April 22, 23 and 24. Engineering Societies Building, 29 West 39th St., New York City.

National Metal Trades Association. Twenty-seventh annual convention. Hotel Cleveland, Cleveland, Ohio, April 22. J. E. Nyhan, national secretary, Peoples Gas Building, Chicago, Ill.

The National Supply and Machinery Distributors' Association. Twentieth annual convention, Ambassador Hotel, Atlantic City, April 27, 28 and 29. George A. Fernley, secretary and treasurer, 505 Arch St., Philadelphia, Pa.

Southern Supply & Machinery Dealers' Association and the American Supply & Machinery Manufacturers Association, Joint Convention. The Atlanta-Biltmore Hotel, Atlanta, Ga., May 5, 6 and 7. F. D. Mitchell, secretary-treasurer, 1819 Broadway, New York City.

The Society of Industrial Engineers, National Convention. Hotel Winton, Cleveland, Ohio, May 6, 7 and 8. Executive secretary, George C. Dent, 608 S. Dearborn St., Chicago, Ill.

American Gear Manufacturers' Association. Ninth annual convention, May 6, 7 8 and 9. The William Penn Hotel, Pittsburgh. Pa. T. W. Owen secretary, 2443 Prospect Ave., Cleveland, Ohio.

American Society of Mechanical Engineers. Spring Meeting. Milwaukee, Wis. May 18, 19, 20 and 21. Calvin W. Rice, secretary, 29 West 39th St., New York City.

Society of Automotive Engineers. Summer Meeting. Greenbrier Hotel, White Sulphur Springs, W. Va., June 16, 17, 18 and 19. C. F. Clarkson, secretary, 29 West 39th St., New York City.

American Society for Testing Materials. Twenty-eighth annual meeting. Chalfonte-Haddon Hall Hotel, Atlantic City, N. J., June 22, 23, 24, 25 and 26. C. L. Warwick, secretary-treasurer, 1315 Spruce St., Philadelphia, Pa.

National Foreign Trade Council. Annual Convention. Seattle, Wash., June 24, 25 and 26. O. K. Davis, secretary, India House, Hanover Square, New York City.

New Haven Branch of the American Society of Mechanical Engineers. Fifth annual machine tool exhibition. Sept. 8 to 11. Mason Laboratory. H. R. Westcott, chairman.

American Society for Steel Treating. Annual Convention and National Steel Exposition. Public Auditorium, Cleveland, Ohio. Week of Sept. 14. W. H. Eisenman, Secretary, 4600 Prospect Ave., Cleveland, Ohio.

The Weekly Price Guide

Rise and Fall of the Market

Iron and Steel—Iron steady as to price and output. Scrap more active, despite drop of $1 per ton in heavy melting steel. Steel sheet buying slower; no definite change in prices. Demand is most active in pipe, railway materials, structurals, steel for automotive use and reinforcing bars.

Non-Ferrous Metals—Lead market is weaker here and abroad; the opposite condition, however, prevails in tin. Copper is quiet. The present decline in zinc may halt owing to scarcity of reserve stocks. Fabricated copper products dropped ¼c. to 1¾c. per lb. in Cleveland during the week. Fabricated brass fell ¼c. to 2¼c. per lb. in the same market.

(All prices as of March 26)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$26.05
Northern Basic	23.77
Southern Ohio No. 2	23.77
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	32.25
BIRMINGHAM	
No. 2 Foundry	22.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	24.76
Virginia No. 2	30.17
Basic	24.76
Grey Forge	23.75
CHICAGO	
No. 2 Foundry local	22.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	28.01
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	23.77
Basic	23.77
Bessemer	23.77

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.75
Cleveland	4.75@5.00
Cincinnati	5.00@7.50
New York	5.00@5.50
Chicago	5.25@5.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	New York	Cleveland	Chicago
No. 10	2.70	3.89	3.45	3.80
No. 12	2.80	3.94	3.50	3.85
No. 14	2.90	3.99	3.55	3.95
No. 16	3.10	4.09	3.65	4.15
Black				
Nos. 17 and 21	3.35@3.45	4.55	4.15	4.30
Nos. 22 and 24	3.40@3.50	4.60	4.20	4.35
Nos. 25 and 26	3.45@3.55	4.65	4.25	4.40
No. 28	3.50@3.60	4.75	4.35	4.50
Galvanized				
Nos. 10 and 11	3.65@3.75	4.75	....	4.50
Nos. 12 and 14	3.75@3.85	4.85	....	4.60
No. 16	3.90@4.00	5.00	....	....
Nos. 17 and 21	4.05@4.15	5.15	....	4.90
Nos. 22 and 24	4.20@4.30	5.30	3.00	5.05
No. 26	4.35@4.45	5.45	4.15	5.20
No. 28	4.65@4.75	5.75	5.45	5.50

WROUGHT PIPE (Welded)—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	59½%	48%
3½ to 6 in. steel lap welded	48%	35%	53½%	40½%	56½%	45%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4%; class A, plus 23%. Cast iron, standard sizes, 36% off.

Size, Inches	List Price per Foot	Diameters Inches External	Diameters Inches Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following base discounts are on 20 gauge or .035-in., round, cold-drawn tubing, ¼-in. to 1-in., O.D., weighing 0.17 lb. to 0.36 lb. per ft. Cutting charge per 100 cuts, $1.50 to $1.58:

O.D. Inches	List Price per ft.	Differential Discount	O.D. Inches	List Price per ft.	Differential Discount
¼	$0.09	50%	⅞	$0.16	35%
⅜	.11	45%	1	.18	31%
½	.14	40%			

NOTE—The discounts are to be lowered by the following differentials in the case of regular .10-.20 carbon: 25,000 ft. or over, 83; 15,000 to 25,000 ft., 82; 5,000 to 15,000 ft., 81; 1,000 to 5,000 ft., 80; less than 1,000 ft., 79.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.50	6.00	4.20
Spring steel (light) (base)	7.00	6.00	6.00
Coppered Bessemer rods (base)	6.85	8.00	7.20
Hoop steel	4.49	3.85	4.15
Cold rolled strip steel	7.00	8.25	7.85
Floor plates	5.55	4.60	5.50
Cold drawn shafting or screw	4.15	4.00	3.80
Cold drawn flats, squares	4.65	4.50	4.30
Structural shapes (base)	3.34	3.20	3.10
Soft steel bars (base)	3.24	3.10	3.00
Soft steel bar shapes (base)	3.24	3.11	3.00
Soft steel bands (base)	3.99	3.20	3.65
Tank plates (base)	3.34	3.42½	3.10
Bar iron (3.00@3.10 at mill)	3.24	3.21	3.00
Drill rod (from list)	60%	55%	50%

Electric welding wire, New York, 5/32, 8.35c.; ¼, 7.85c.; 5/16 to ½, 7.35c. per lb. Chicago, 5/32, 8.85c.; 3/16, 7¼c.; ¼, 7.95c. per lb.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York			14.87½
Tin, 5-ton lots, New York			54.25
Lead (up to carlots), St. Louis	8.50	New York	9.12½
Zinc (up to carlots), St. Louis	7.40	New York	8.12½

	New York	Cleveland	Chicago
Antimony (Chinese), ton spot	15.50	17.75	....
Copper sheets, base	22.50	22.25	22.12½
Copper wire, base	20.12½	21.25	20.75
Copper bars, base	21.75	21.50	22.62½
Copper tubing, base	24.75	24.25	25.75
Brass sheets, base	19.12½	18.62½	19.25
Brass tubing, base	23.75	25.25	25.00
Brass rods, base	17.12½	16.37½	18.37½
Brass wire, base	19.62½	20.12½	20.25

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminium ingots, 98 to 99%, 1–15 ton lots	27.20	28.00	27.00
Zinc sheets (casks)	11.00	11.50	11.37
Solder (½ and ½), (case lots)	38.00	37.00	.....
Babbitt metal (83% tin)	60.00	64.00	50.00
Babbitt metal (35% tin)	28.00	21.00	28.00
Nickel (ingots) f.o.b. refinery	29.00	.....	.....
Nickel (electrolytic) f.o.b. refinery	33.00	.....	.....
Nickel (F shot) f.o.b. refinery	30.00	.....	.....

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Rolled nickel sheet (base)	52.00
Hot rolled rods, Grade "A" (base)	50.00
Cold drawn rods, Grade "A" (base)	58.00
Manganese nickel hot rolled rods "E"—low manganese (base)	54.00
Manganese nickel hot rolled rods "D"—high manganese (base)	57.00

Base price of monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	40.00
Blocks	32.00	Cold drawn rods (base)	48.00
Ingots	38.00	Hot rolled sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible heavy copper	12.00@12.25	11.50	12.00
Copper, heavy, and wire	11.75@12.00	11.50	11.50@11.75
Copper, light, and bottoms	10.25@10.50	9.50	10.50
Heavy lead	7.50@7.75	7.00	8.00
Tea lead	6.50@6.75	4.50	6.75
Brass, heavy, yellow	7.25@7.50	7.50	8.00@8.25
Brass, heavy, red	9.25@9.50	9.50	9.75
Brass, light	6.25@6.75	6.25	6.75
No. 1 yellow rod turnings	7.75@8.00	7.25	8.00
Zinc	4.50@4.75	4.00	5.00

TIN PLATES—American Charcoal—Bright—Per box.

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	20x28, 112 sheets	$23.50	$22.85	$21.00
"A" Grade:				
IC,	20x28, 112 sheets	19.00	18.80	17.00
	Coke Plates—Primes, 20x28 in.			
100-lb.,	112 sheets	13.00	13.50	13.00
	Terne Plates—Small lots, 8-lb. Coating			
IC,	14x20	7.25	6.80@6.90	6.75

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.15@0.22	$0.19	$0.14@0.16
Cotton waste, colored, per lb.	.10@.15½	.18	.09½@.12½
Wiping cloths, 13¼x13¼, per lb	.09¼@.09¾	36.00 per M	.11
Wiping cloths, 13¼x20½, per lb.	....	50.00 per M	.11
Sal soda, per 100 lb. keg	2.25	2.25	2.25
Roll sulphur, per 100 lb. keg	3.60	3.25	3.75
Linseed oil, per gal., 5 bbl. lots	1.14	1.32	1.25
Lard cutting oil, 25% lard, per gal.	.60	.50	.32
Machine lubricant, medium-bodied (50 gal. wooden bbl.), per gal.	.33	.35	.21
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin. ft. per inch of width for single ply.			
Medium grade	40–2½%	30–10%	40–2½%
Heavy grade	30–5%	30%	38–5%
Rubber transmission, 6-in., 6 ply, $1.83 per lin. ft.			
First grade	50–5%	50–10%	60%
Second grade	50–10–5%	60–5%	65%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0324	$0.0324	$0.0354
Cold finished shafting	per lb.	.0415	.0415	.044
Brass rods	per lb	.1712½	.1762½	.16
Solder (½ and ½)	per lb.	.38	.42	.39
Cotton waste	per lb.	.15@.22	.15@.22	14@21
Washers, cast iron (½ in.)	per 100 lb.	7.00	6.50	6.50
Emery, disks, cloth, No. 1, 6 in. dia.	per 100	3.38	3.38	3.38
Lard cutting oil	per gal.	.60	.60	.58
Machine oil	per gal.	.33	.33	.29
Belting, leather, medium	off list	40–2½%	40–2½%	40–2½%
Machine bolts up to 1x30 in.	off list	40%	45%	45%

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—In sheets 9x11 in., No. 1 grade, per ream of 480 sheets:			
Flint paper	$4.86	$5.84	.....
Emery paper	10.71	11.00	$11.90
Emery cloth	28.00	31.12	32.75
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1.49	1.24	1.65
Cloth	3.38	2.67	3.55
Fire clay, per 100 lb. bag	.....	.65	.75
Coke, prompt furnace, Connellsville	per net ton		3.50@3.75
Coke, prompt foundry, Connellsville	per net ton		4.25@4.75
White lead, dry or in oil	100 lb. kegs	New York, 16.25	
Red lead, dry	100 lb. kegs	New York, 16.25	
Red lead, in oil	100 lb. kegs	New York, 17.75	

SHOP SUPPLIES

Machine bolts, ¼x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%; 1¼ and 1¼x3-in. up to 12-in., 15%; with cold punched hex. nuts up to 1-in. dia. (plus std. extra of 10%) 30%; with hot pressed hex. nuts up to 1x30-in. (plus std. extra of 10%) 35%. Machine bolts, up to 1x30-in., with cold punched and hot-pressed hex. nuts, also button head bolts with hex. nuts are $3.50 per 100 lb. at Cleveland.

Carriage bolts, ¼x1½-in., per 100, $1.00. Discount on all sizes up to 1x30-in., 30%.

Coach and lag screws, 1½x$\frac{5}{16}$-in., $2.25 per 100, less 40%.

Tap bolts, 1½x¼-in., $1.00 per 100. List plus 35% at New York warehouses; with hex. heads, $4.65 per 100 lb. net at Chicago.

Bolt ends, 1x12-in., 10c. per lb., less 40%.

Nuts, semi-finished, ¼x¼-in., 2c. each. Discount 70% for $\frac{5}{16}$-in. and smaller and 65% for ⅜-in. and larger.
Case hardened ¼x¼-in., 6c. each, less 50%.

Rivets, button heads, ⅜-in., ½-in., 1-in. diam. x2$\frac{1}{16}$-in. to 4½-in., $5.00* per 100 lb. at New York warehouses; cone heads, same sizes, $5.20* per 100 lb. Rivets, $\frac{7}{16}$x1-in. and longer, 19c. per lb., less 50%. Same discount for tinned. EXTRA per 100 lb. for 1½ to 2-in. long, all diameters, 25c.; ⅜-in. dia., 35c.; ½-in. dia., 75c.; 1-in. long and shorter, 75c., longer than 5-in., 50c.; less than 200 lb., 50c.; countersunk, heads, 45c.

Washers, cast iron, ½-in., $7.00* per 100 lb. at New York warehouses; ⅜-in., $6.00* per 100 lb.

*For immediate delivery from warehouse.

Machine Requirements and Industrial Construction

Machine Tools and Equipment Wanted

Ark., Gurdon—J. F. Gresley—equipment for woodworking plant, to be constructed here.

Conn., Derby—Birmingham Iron Foundry—machine for drilling plates.

Ga., Tifton—Kell-Smith Co., M. W. Smith, Gen. Mgr., 318 Elm St.—acetylene outfit, 28 in. drill press, 18 in. lathe, miscellaneous hand tools, Heald cylinder grinder (used).

Ill., Rockford—National Lock Co., A. Strandquist, Pur. Agt. — equipment for small brass foundry, light machines, shaftings, hangers, etc., for 6 story addition to plant.

Mass., Boston — Green & Shapiro, Old South Bldg. — miscellaneous tools and equipment for repair and service garage, on Wilder Rd., Dorchester.

Mass., Boston—E. J. McDonald, 77 Summer St., Engr.—miscellaneous tools and equipment for garages in Newton.

Mass., Boston—Schoolhouse Dept., City Hall, T. P. Glynn, Chr.—band saw and benches in new Dorchester High School for Boys, Dunbar Ave., Dorchester.

Mass., Dorchester (Boston P. O)—S. Cole, 240 Blue Hill Ave.—equipment and repair tools for garage on Layola St.

Mass., Jamaica Plain (Boston P. O.)—W. A. McPherson, 10 Roseway St.—miscellaneous tools and equipment for two story garage on Washington St.

Mass., Roxbury (Boston P. O.)—J. L. Roberts, 47 Vancouver St.—equipment and tools for large repair and service garage.

Mass., South Boston—Carlson Bros., Tool and Machine Co., 15 B St.—lathe, 16 or 18 in. swing, and 8 ft. bed.

Mass., South Boston (Boston P. O.)—H. Keystone Mfg. Co., 288 A St.—No. 3A hammer blow riveter; universal surface grinder; back geared punch press; three No. 3 or 4 punch presses, Consolidated Inclinable or 22 Bliss.

Mich., Detroit—Detroit Show Case Co., 1654 West Fort St.—equipment for manufacture of show cases, for plant enlargement.

Mich., Detroit — Stromberg Carburetor Co., 6645 Gratiot Ave.—shop equipment for service department of manufacturing plant.

Mich., Detroit—Whitehead & Kales, 2361 Beecher St.—crank shaft press 12 to 14 in., 500 ton capacity.

N. Y., Buffalo—F. Gonnella, 133 Spruce St.—small tools and equipment for garage repair shop.

N. Y., Buffalo—Hirschmann Ventilator Co., 92 Main St.—electrically operated machinery for manufacturing ventilators and auxiliary equipment, for plant in LeRoy, N. Y.

N. Y., Buffalo—F. X. Minet, 865 East Ferry St.—tools and equipment for proposed tin shop.

N. Y., New York—Graham and Norton Co., 126 Eleventh Ave.—additional equipment for the manufacture of elevator door closing devices.

N. Y., New York—The Seymour Manufacturing Co., Woolworth Bldg., 233 Broadway, F. G. Space, Pur. Agt.—machines for washing, cleaning and drying pickled nonferrous metal, in heavy gage flat strips, 5 to 20 ft. lengths for plant at Seymour, Conn. Drying can be by sawdust or equivalent method, producing a dry lustrous surface.

N. Y., New York—Silmig Machine Wks., 216 Centre St.—16-in. swing lathe.

O., Bryan—The Bryan Sc.ew Products Co.—additional equipment for present plant.

O., Galion—Bd. of Education—equipment and machinery for wood and metal working, in manual training shops, at proposed junior high school.

Pa., Corry—City Commission—grinder, small lathe and drill press, for new repair shop.

Pa., Moore—Alloy Metal Wire Co.—electric induction, melting furnaces, 500 lb. capacity per heat.

Pa., Pittsburgh—W. N. Kratzer Co., 3212 Smaliman St.—radial drill, rotary planer, punches and shears.

R. I., Providence—E. T. Arnold, 175 Armington St., Edgewood station—combination woodworker and planer.

Wis., Janesville—Northern Conveyor & Mfg. Co., 3204 Auer Ave., Milwaukee—5 ton traveling crane for plant here.

Wis., Milwaukee—G. A. Schoenfeld, 551 18th Ave.—small lathe.

Ont., Goderich—Dominion Road Machinery Co., T. H. Mitchell, Mgr.—equipment for factory enlargement.

Ont., Holland Center — R. F. Harber, Holland Center, via Owen Sound—equipment for saw mill.

Ont., Mitchell—Wettlaufer Bros., Ltd.—equipment for manufacture of concrete mixers, paving equipment, etc., for new plant.

Opportunities for Future Business

Ark., Gurdon—J. F. Gresley, plans the construction of a wookworking plant. Estimated cost $30,000.

Calif., Napa—Napa Union High School Dist., plans the construction of a 40 x 160 ft. mechanics' school, including automobile, plumbing, sheet metal, carpentry and machine shop departments. Estimated cost $15,000.

Calif., San Bernardino—Atchison, Topeka & Santa Fe R.R., 6th and Main Sts., will soon receive bids for the construction of a 3 story, 50 x 275 ft. shop buildings, here. Estimated cost $165,000. R. B. Ball, Ch. Engr. of Coast Lines.

Conn., Milldale (Hartford P. O.)—Clark Bros. Nut and Bolt Co., plans the construction of a 42 x 148 ft. factory addition. Estimated cost $40,000. W. T. Arnold, Meridan, Archt.

Ga., Tifton — Kell-Smith Co. is having plans prepared for the construction of a 40 x 80 ft. general repair shop at plant. M. W. Smith, 318 Elm St., Gen. Mgr. and Engr.

Ill., Chicago—Hibbard, Spencer, Bartlett Co., 303 North State St., manufacturers of hardware, will soon award contract for the construction of a 14 story, 172 x 420 ft. sales and factory building, on North Water St. Estimated cost $4,000,000. Graham, Anderson, Probst & White, 80 East Jackson Blvd., Archts.

Ill., Chicago—Joslyn Mfg. & Supply Co., Chamber of Commerce Bldg., M. L. Joslyn, Pres. awarded contract for the construction of a 130x230 ft. hot-dip galvanizing plant, as addition to pole line material's plant, at 3700 South Michigan Ave. Estimated cost $250,000.

Ill., Chicago — William Schukraft, 943 Fulton St., manufacturers of truck bodies, is having plans prepared for the construction of a 3 story, 140 x 220 ft. factory, on West Washington St. Estimated cost $300,000. E. H. Freeman, 64 West Randolph St., Archt.

Ind., New Castle—National Spring Co. plans the construction of a 180 x 240 ft. factory. Estimated cost $65,000.

Md., Baltimore—Bd. of Awards, City Hall, awarded contract for the construction of a repair shop at Key Highway and Webster St., for the Baltimore Fire Dept. $85,989.

Mass., Danvers—Town, is receiving bids for the construction of a 2½ story, 35 x 45 ft. and 14 x 15 ft. fire station and machine repair shop, at Florence and High Sts. Stebbins & Watkins, 164 Federal St., Boston, Archts.

Mass., Everett — Mystic Iron Wks., 1 Federal St., Boston, is taking bids for the construction of a blast furnace, here. Fine & Bassett, Chicago, Ill., Archts.

Mass., Medford—Boston Elevated Railway, Park Sq. Bldg., Boston, plans the construction of a 20,000 sq.ft. garage and repair shop on Salem St., here. Estimated cost $114,000. Private plans.

Mass., New Bedford — New Bedford Boiler & Machine Co., 42 Frost St., is taking bids for the construction of a 4 story, 60 x 165 ft. warehouse, and plant addition, on Frost St. Leary & Walker, 908 Purchase St., Archts.

Mass., South Boston (Boston P. O.) Daniel Marr & Sons., 384 Dorchester Ave., J. D. Marr, Pres. will build by separate contracts, a 2 story 100 x 200 ft. garage at Old Colony Ave. and D St. Estimated cost $175,000. Noted Jan. 29.

Mich., Detroit—Dodge Bros., 7900 Jos. Campau Ave., will build a 75 x 500 ft. light hammer shop at plant. Smith, Hinchman & Grylls, 800 Marquette Bldg., Archts. Noted March 19.

Mich., Detroit — Stromberg Carburetor Co., 6645 Gratiot Ave., is having plans prepared for the construction of a 2 story, 50 x 160 ft. factory and service building, on Hancock Ave. Estimated cost $50,000. Smith, Hinchman & Grylls, 800 Marquette Bldg., Archts.

Mich., River Rouge—A. Kahn, 1000 Marquette Bldg., Detroit, Archt., will receive bids about April 10th, for the construction of a 160 x 240 ft. open hearth building, for the Ford Motor Co., Highland Park. Noted Feb. 12.

Mo., North Kansas City—Wabash Railway Co., Railway Exchange Bldg., St. Louis, is having plans prepared for improvements, including construction of machine shops, roundhouse, etc. Total Estimated Cost $200,000. R. H. Howard, Railway Exchange Bldg., St. Louis, Ch. Engr.

N. Y., Buffalo—Otis Bed Manufacturing Co., 170 Florida St., plans the construction of a factory on Florida St. Estimated cost $25,000.

O., Alliance—McCaskey Register Co., will soon award contract for the construction of a 2 story factory, on South Union St. Estimated cost $500,000. Lockwood, Greene & Co., 24 Federal St., Archts. Noted Dec. 25, 1924.

O., Canton—Union Metal Manufacturing Co., 1432 Maple Ave. N. E. C. C. Barrick, Pres., plans the construction of a factory on Maple Ave. Estimated cost $40,000.

O., Cincinnati—Ohio Pattern Wks., 2730 Spring Grove Ave., awarded contract for the construction of a 60 x 220 ft. foundry addition. $18,000.

O., Galion—Bd. of Education, will soon award contract for the construction of a 3 story, 127 x 233 ft. junior high school, with manual training shops. Estimated cost $350,000. Althouse & Jones, Mansfield, Archts.

Wis., Madison—Fox Motor Sales Co., 105 East Doty St., has had plans prepared for the construction of a 2 story, 122 x 134 ft. garage on West Johnson St. Estimated cost $150,000. A. L. Seidenschwartz, 190 Third St. Milwaukee, Archt.

Wis., Milwaukee—Harischfeger Corp., 811 Robinson Ave., will build a 62 x 90 ft. addition to core room, on Robinson Ave., by day labor. Noted March 12.

Wis., Milwaukee — Smith Engineering Wks., 1154 32nd St., awarded contract for the construction of a 200 x 245 ft. manufacturing plant, on Lake St. Estimated cost $150,000.

Wis., Oshkosh — R. McMiller Co., 633 High St. (sash and doors interior finish) awarded contract for the construction of a 3 story, 30 x 90 ft. factory addition, on High St. Estimated cost $25,000.

Ont., Ottawa—G. P., K. Davidson and A. E. Dyment, plans the construction of a 66 x 108 ft. garage on Queen St. Estimated cost $150,000. Engineer and architech not announced.